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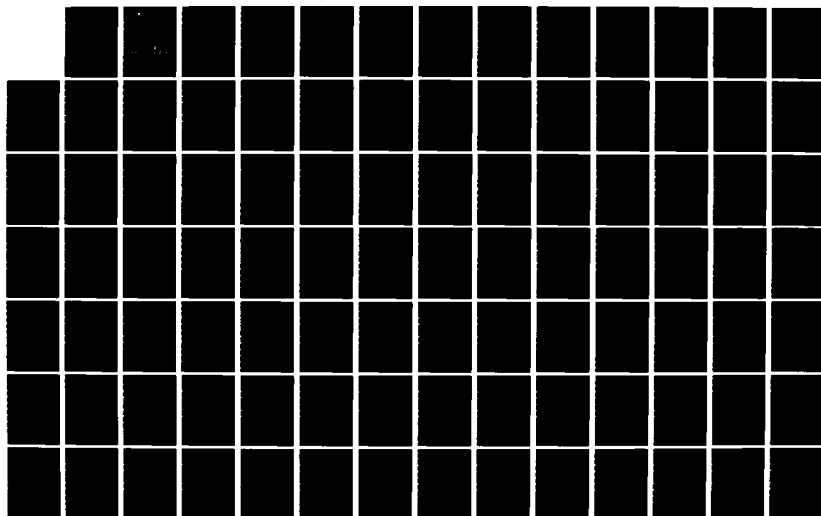
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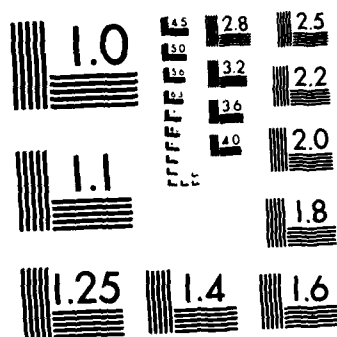
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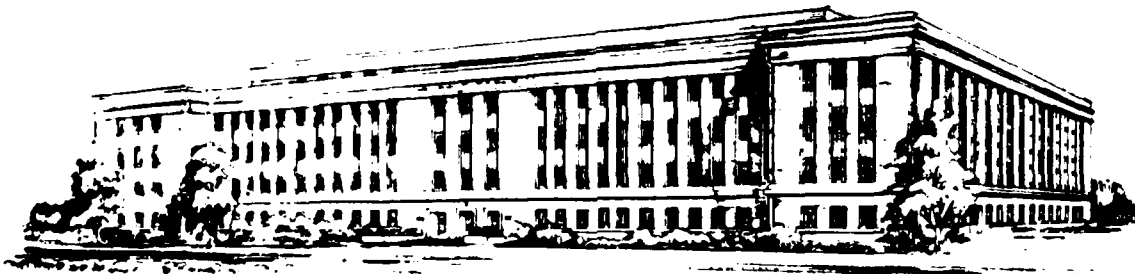
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NATIONAL DEFENSE UNIVERSITY

MOBILIZATION AND DEFENSE MANAGEMENT
TECHNICAL REPORTS SERIES

GROWING DEFENSE PRODUCTION IN NEWLY
INDUSTRIALIZED COUNTRIES: IMPACT ON U.S.
NATIONAL SECURITY POLICY



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INDUSTRIAL COLLEGE OF THE ARMED FORCES
NATIONAL DEFENSE UNIVERSITY

MOBILIZATION STUDIES PROGRAM REPORT

GROWING DEFENSE PRODUCTION IN NEWLY INDUSTRIALIZING
COUNTRIES: IMPACT ON U.S. NATIONAL SECURITY

by

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A RESEARCH REPORT SUBMITTED TO THE FACULTY
IN
FULFILLMENT OF THE RESEARCH
REQUIREMENT

STUDENT CHAIRMAN: COL. DAVID L. MORRIS, USAF
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THE INDUSTRIAL COLLEGE OF THE ARMED FORCES

MAY 1983



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PREFACE

This paper explores the phenomenon of arms production in newly industrial nations. Some scholars have touched on this topic in passing while studying the weapons business as it applies to the older industrialized countries; no one, however, has pursued the issue to the extent treated here.

In examining this question we have tried to place it in the widest possible context. The focus is both heavily numerical and deeply analytical. To justify the time and effort given to the narrative we felt it critical to compile a broad summary of weapons production. The tables at the back of the paper appear to be the most complete effort of their type, from unclassified sources, to document production of weapons by particular newly industrialized countries.

In turn, the narrative, while highlighting specific armament production and sales, offers political economic and military analysis of the countries studied with special attention to regional implications. The seven countries chosen represent a broad geographical range and sizeable economic resources. The country analyses set the focus for the paper. The regions represented are Southern Africa, Latin America, East Asia, the Indian Subcontinent, and the Middle East. The seven countries account for a large percentage of total arms manufactured in newly industrialized countries and for most weapons exports of other than the historically significant arms suppliers.

The argument of the paper is that this new source of weapons is a growing, significant phenomenon which United States policymakers will increasingly have to take into account. We believe this paper will help set the terms of debate and to establish a useful frame of reference for policymakers and students of international arms policy. The ending section is entirely focused on policy options and implications for the United States.

A special appreciation is due to Alice Crupi and her associates who transcribed and typed the paper through several tortured incarnations and without whose good humor and energy it would never have emerged in final form.

ABSTRACT OF STUDENT RESEARCH REPORT
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ABSTRACT

The growth in arms production among newly industrializing countries, while not dramatic or decisive in global terms, is proving important to international relations in general and to U.S. national security interests in particular. In all likelihood, these capacities will grow, but not come near matching those of the major arms suppliers in the coming decades. In specific regions and at specific times such manufacturing prowess could affect the course of history. Up to the present this new industrial dynamic has had a limited impact, but it could prove more influential in the future. At any rate, the United States is well advised to pay closer attention to this development and to fashion policies that seek to ensure that new arms production supports rather than conflicts with its national security goals. No single grand policy will prove effective. Instead, this country should follow a two-tracked approach, striving to lessen the proliferation of arms industries on a global scale, but deciding whether to give assistance to weapons production aspirants on a case-by-case basis to individual countries in light of what it perceives are its interests.

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EXECUTIVE SUMMARY

GROWING DEFENSE PRODUCTION IN NEWLY INDUSTRIALIZING COUNTRIES: IMPACT ON U.S. NATIONAL SECURITY

Twenty-five years ago the United States, Great Britain, France and the Soviet Union enjoyed a near monopoly of the world's arms production and export. Today, a fundamental change is beginning to occur that, over time perhaps, could have important consequences for international relations in general and for U.S. national security policy in particular. This change is occurring among "newly industrializing" countries whose growing manufacturing capabilities have also begun to produce and export military arms, spare parts and ammunition.

This study seeks to validate the following hypothesis:

The proliferation of conventional weapons production capabilities in newly industrializing countries potentially could have significant long-term impact on regional power relationships affecting U.S. national security interests, requiring U.S. national security decisionmakers to develop specific policies toward those new arms producing nations.

To validate this hypothesis certain key questions require answers. First, does the growth in conventional arms production capabilities in recently industrializing countries pose truly serious near or long-term national security problems for the United States? Second, if it does, what practical, political, military, and economic actions can the United States take in attempting to influence the character of such arsenals in specific countries? Third, what options are available to the United States for influencing the impact of these new sources in the international arms trade?

Seven newly industrializing countries are analyzed to derive answers to these questions. Israel, South Africa, Brazil, Argentina, Taiwan, South Korea and India represent the largest proportion of these nations that are producing and, in some cases, exporting weapons. From this analysis the following generalizations are concluded:

- 1) History offers scant hope that nations attempting to prevent others from achieving greater self-sufficiency in arms will reach their objectives.
- 2) Third World nations will strive to produce their own arms unless the causes of war and insurrection are removed.

3) Presently, it is difficult to determine whether the proliferation of arms industries will prove stabilizing or destabilizing in any particular region.

4) Nations continue to view increased domestic arms production as one way of achieving greater freedom of action.

5) The tendency of some major arms suppliers, particularly the United States, to set ceilings on total arms sales and place special conditions on sales stimulated newly industrializing countries to build their own arsenals.

6) Regardless of the efforts of newly industrializing countries to produce arms, their output cannot change the nature of total world production in any critical way within this century.

7) Newly industrializing countries having the capability to build an arms industry have arrived at the takeoff stage of economic growth. They possess adequate land, labor, resources and capital. Lacking is technological innovation.

8) Nations building domestic arms industries usually seek to export their military products.

U.S. Policy Options

Two options seem to offer sensible courses of action for the United States and taken together offer a useful two-track approach. First, the United States can subscribe to the ideal of restraining indiscriminate proliferation of arms production capabilities and take positive steps to achieve this objective. For example, the U.S. could encourage regional conferences in which neighbors would agree to limit their arsenal expansion. Rigid prohibitions must be avoided, of course, since they are impractical and counterproductive. Second, the United States should tailor individual policies to specific countries, either denying them manufacturing knowledge or aiding them to reach their arms production goals. Such an approach seems paradoxical when viewed with its companion policy option. Yet, reality demands that this country must be selective in providing assistance. In implementing this dual tracked policy, the following guidelines should be observed.

First, this nation should naturally consider the impact of a newly industrializing country's arms industry on U.S. national security interests worldwide. Second, it should consider the normal questions of internal security of the arms producers as well as the impact of increased weapons manufacturing on its ability to provide self-defense. Third, the probable impact on possible drives by such a country for regional hegemony or

territorial expansion rates high on the list of considerations. Fourth, the effects on possible Soviet influence in that country or in the region deserves serious thought. Fifth, the United States must assess whether denial of assistance will prompt nations with arms production aspirations to seek aid elsewhere, including the Soviet Union, with consequent political and economic losses to the United States. Lastly, the United States also must consider the industrial mobilization opportunities presented by a growing number of arsenals in friendly hands.

Summary

The United States should pay close attention to the development of arms production among the newly industrializing nations. No single grand policy will prove effective. Instead, this country should follow a two-tracked approach, striving to lessen the proliferation of arms industries on a global scale, but deciding whether to give assistance to weapons production aspirants on a case-by-case basis based on U.S. national interests.

CHAPTER I

INTRODUCTION AND OVERVIEW

During the war in the Falkland Islands in 1982 the British Government hurriedly sought assurances from the South Africans that they would not sell domestically produced sea-skimming Scorpion missiles to Argentina. The Scorpion, a copy of the Israeli Gabriel II missile, operates like the French Exocet missiles that Argentine aircraft had used with telling effect against British ships. In response, the South Africans denied any intention of making such a sale. However, they pointed out that because Britain obeyed the international arms embargo against their country, they felt no obligation to restrict their arms trade.¹ One might speculate that if the South Africans had made available such missiles to Argentina quickly and in large quantities, the war at sea around the Falklands might have had a different history.

In January 1983 a conference of representatives of the Nonaligned Movement, meeting in Managua, denounced Israel for, among other acts, making arms sales to Latin American countries.² In fact, by the winter of 1983 through the sale of indigenously produced armaments and through other forms of military and security assistance, the Israelis had helped the Guatemalan Government successfully counter that country's leftist insurgent movement. The question of arms sales by other than the major weapons producers had become an issue raised by nonaligned nations, entering their strident rhetoric against the West.

Twenty-five years ago such events would not have taken place. In those days only four arms producers, the United States, Great Britain, France, and the Soviet Union, enjoyed a near monopoly of the world's arms production and export. Granted, some smaller industrialized countries like Belgium, Czechoslovakia, Sweden, and Switzerland also manufactured and sold armaments abroad. However the big four continued totally to dominate international arms traffic until fairly recently. These episodes, then, suggest that a fundamental change is just beginning to occur that over time perhaps could have important consequences for international relations in general and for U.S. national security policy in particular.

In analyzing the significance of the growth of arsenals throughout the world, one first must deal with certain facts. In their quest for economic development some countries are fashioning significant industrial capabilities. We commonly refer to these countries as "newly industrializing." This term offers a very imprecise label. Some nations, like South Africa and Israel, long have had some degree of Western style manufacturing. Their industrial character is "new" only because they now not only make many more products, but these products often incorporate the most modern technology. Other countries, like Korea and Taiwan, are building industrial enterprises atop traditional, agrarian societies which in the past had relatively little experience with manufacturing. The important point is that the newly industrializing nations, as distinct from their older counterparts (chiefly in North America and Europe), have only recently achieved enough production to become a significant factor in world trade and politics.

In some cases, industrializing countries simultaneously are developing conventional arms production capabilities of varying size, type and performance. Many of these nations aim to use their defense production both for supplying their own arms forces with armaments and whenever possible for exporting within and outside of their regions. To keep this matter in perspective, one should consider that the newly industrializing nations represent only some of the countries that engage in arms exports. At any given time, over sixty nations are selling arms to others. For the most part these sales are re-exports of older weapons that they previously acquired, usually from the major suppliers.³ A few newly industrializing countries are beginning to emerge as suppliers of indigenously produced military hardware (although in many cases foreign designs are used). These new arms producers now appear in such diverse geographic areas as the Middle East, Sub-Sahara Africa, the Far East, and Latin America. In this study we shall focus on seven of these producers--Argentina, Brazil, South Korea, Taiwan, Israel, India and South Africa. Other arms manufacturing countries in the developing world produce older, less sophisticated weapons and equipment (e.g., munitions and arms) and make these in small quantities.

Points of View

Scholars and analysts have studied extensively questions of nuclear proliferation and this study does not address the matter of nuclear weapons manufacturing. Furthermore, many have examined the global traffic in conventional arms between the major producers and recipients throughout the

world and this aspect of arms sales needs no elaboration here. This study concentrates on assessing the recent spread of indigenous defense production capabilities in newly industrializing lands, a subject that has received scant attention in the literature. Of course, when pertinent, the relationship between the older, major producers and the newer, emerging producers will be explored.

The few who have studied the subject have advanced some definite views. Andrew Pierre argues that these growing arsenals will have little effect on international arms traffic in general. In fact, he asserts that there is a tendency to overstate the importance of the increasing number of arms producers.⁴ Consequently, one would conclude that this new source of armaments will pose no major problems for U.S. national security decision-makers. Robert Shuey of the Congressional Research Service asserts that the proliferation of arms production capabilities throughout the world could prove harmful to maintaining peace. It leads to destabilizing arms races that could provoke local attacks and exacerbate strained relations among rival nations. Moreover, such arms production demand human and financial resources that the leaders of these countries could more profitably use for improving their economic and social conditions.⁵ Shuey maintains that the older arms producers are in large part responsible for these adverse trends because they assist the newly industrialized countries in improvising their technological competence in weapons production. In sum, Pierre contends that growing arsenals can have little impact while Shuey says that they could influence global events, and do so in unwholesome ways.

This study approaches the subject from a different perspective and with another emphasis. It seeks to validate the following hypothesis:

The proliferation of conventional weapons production capabilities in newly industrializing countries potentially could have significant long-term impact on regional power relationships affecting U.S. national security interests, requiring U.S. national security decisionmakers to develop specific policies toward these new arms producing nations.

This study agrees with Pierre's contention that the emergence of new arms sources cannot soon challenge the pre-eminent position of the United States, Great Britain, France and the Soviet Union in the global arms market. It does contend that relatively modest production and export of needed arms and equipment, especially during critical times, could have significant consequences, as might have happened in the Falkland Island case. Furthermore, these armaments need not be the most technologically advanced to affect the course of international events. Just as important, such exports could create or influence international situations in which the United States has a vital stake.

As this study will show, Shuey's proposed blanket prohibition to the flow of defense manufacturing know-how by the advanced countries to emerging weapons producing nations offers too sweeping, and hence an unrealistic policy. Because regional situations present the United States with a variety of problems, adopting a single, rigid policy would prove difficult to implement. President Carter's fixed ceiling on arms exports had to be amended so often that many came to regard his policy as unworkable. Different circumstances demand different responses. Assisting South Korea or Israel involves

national security considerations dissimilar from helping South Africa or India. If the hypothesis of this study is valid, then the United States has to tailor its policies on a case by case basis to cope with specific challenges.

Direction of Inquiry

In order to validate this hypothesis certain key questions require answers. First, does the growth in conventional arms production capabilities in recently industrializing countries pose truly serious near or long-term national security problems for the United States? Second, if it does, what practical, political, military, and economic actions can the United States take in attempting to influence the character of such arsenals in specific countries? Third, what options are available to the United States for influencing the impact of these new sources in the international arms trade? A host of subsidiary questions must be addressed in coming to grips with the above three key questions? In which recent conflicts have arms manufactured in newly industrializing countries been used? What impact, if any, did they have? Can they be expected to have greater consequences in the future? Does this growing capacity provide U.S. foreign policymakers with additional options? For example, could they look to these new suppliers to sell weapons to countries which the United States, for a variety of reasons, might prefer not to sell its own weapons? Does this growing capacity pose additional problems for U.S. foreign policymakers? Will it lead new arms producers to seek regional hegemony? Will it lead to longer, more frequent, and more

destructive wars? Will it increase or decrease the opportunities of the Soviet Union to expand its influence in the developing world? What probable impact might it have on terrorism? Will it affect industrial mobilization of the United States and its allies in times of emergencies or war? Answers to questions such as these not only will prove indispensable in testing the cited hypothesis, but also should improve our understanding of the phenomenon of growing arsenals in general.

Historical and Statistical Context

People today often fail to realize that the concentration of arms production in the hands of a few nations is a recent phenomenon. Throughout most of history societies and nations generally produced their own weapons. In fact, for many centuries military leaders expected fighting men to provide their own weapons (as did the American militias during the colonial period). When fashioning spears or swords posed no greater technical and financial problem than making a plow or hoe, such a logistical base was possible. The ability to make weapons was widely distributed throughout the world. Only the coming of the Industrial Revolution, and the accompanying rise in the complexity and costs of armaments, squeezed many people out of arms production. Nations without an extensive industrial infrastructure could no longer supply the technologically advanced weapons on which modern war came to depend. They now needed steel mills, foundries, chemical plants, and assembly factories. Not surprisingly only those nations which built up the largest and most advanced industrial plant came to enjoy self-sufficiency in arms

production and to achieve a dominant position in the global arms picture. This dominance, in part, helped Europe during the age of imperialism to control the rest of the world.

After World War II the United States came to dominate armaments production within the noncommunist world. Within the past two decades that dominance has eroded. In NATO's early years most Western European armed forces largely used American armaments, in the process achieving a highly standardized fighting force (at least in terms of arms). Independent countries in Latin America, the Far East, the Middle East, and elsewhere likewise depended on the United States as their weapons supplier. In the ensuing years growing defense production in countries like Great Britain, France, Sweden, and West Germany broke the near monopoly of the United States. This country came to face increasingly stiff competition in the Free World arms market. In 1970 the United States exported somewhat over half the arms in international trade.⁶ By 1977 these exports fell to about 30 percent and two years later to 24 percent. Using sales as a major vehicle in its political penetration of the Third World, the Soviet Union increased its arms exports. By 1977 the Soviets captured some 29 percent of the world's arms market; by 1979 its share rose to 44 percent.

Arms imports by the developing world jumped sharply during this period. Between 1970 and 1979 they grew from \$2.1 billion to \$7.3 billion in the Middle East, from \$0.4 billion to \$4.2 billion in Africa, and from \$0.2 billion to \$1.5 billion in Latin America. For our purposes, the important fact is that during the 1970s newly industrializing countries came to account

for a reported 5 percent of global arms traffic, a modest, but significant level. Given the difficulties of tracking arms transactions throughout the world, this level of arms exports by industrializing nations probably is understated. Although we have no precise figures, the seven countries studied here most likely make up a large percentage of total arms manufactured outside the United States, Western Europe, Japan, and the Soviet Union. They certainly produce most of the advanced weapons in the developing world as well as account for most weapons exports of other than the major arms suppliers.

One additional point deserves mention. There seems to be no clear relationship between arms production and export and the share of the Gross National Product (GNP) that a nation earmarks for military purposes. The developed world to which all the major arms suppliers belong, spends some 5.3 percent of its GNP on military forces while the developing world, for the most part highly deficient in armaments production actually devotes some .2 percent more to defense. Moreover, each consumes about 22 percent of its national budget maintaining armed forces. Of course, the absolute amounts of money expended differ considerably; the developed world's military expenditures are some four times greater than that of the developing world.

The lack of a consistent pattern also appears in the newly industrializing countries examined in this study. Of these seven growing arms producing countries, military expenditures as a share of GNP range from a low of 0.8 percent in Brazil to a high of nearly 30 percent in Israel. Even with such a small share, Brazil exported some \$55 million in military items in 1979 while Argentina with 2.5 percent of its GNP for defense exported none. Channeling

some 3 percent of its GNP to meeting defense needs, in 1979 India exported only about \$9 million in military goods while South Korea, devoting only about 1 percent more of GNP for defense than India, sold some \$165 million abroad. Moreover, India spent about 2.5 times more for defense than did South Korea. Of course, the ability of a nation's defense industries to meet the needs of its own armed forces for selected items largely determines its export potential. India's armed forces simply absorbed all the production of the country's defense industries. South Korea too directs its efforts chiefly toward meeting internal requirements.

A Question of Motivation

Before examining the growth of defense production and its implications for these seven countries, at the outset it pays to indicate some broad reasons why some developing countries opt to pursue arms manufacturing.⁷ First, in attempting to bolster their political independence and national security, these countries judge that greater autonomy in military hardware strengthens their position. The validity of this belief will be discussed later. Second, defense industries, like any industries, provide economic benefits like jobs and technical know-how. Third, in a related economic consideration, if they can export arms, they reduce their balance of payments deficit. Fourth, they conclude that by becoming an arms producer they can increase their influence both within their own geographic regions, and sometimes even beyond. For example, the Israelis have enhanced their prestige in as far away places as Latin America and Sub-Sahara Africa. Lastly, inasmuch as arms industries

usually demand working with more advanced technology, these countries not only expand their pool of trained manpower, but also make it more attractive for their skilled personnel to remain at home.

The weights that countries give to these inducements vary. The subsequent discussion will surface some useful insights into the motivations of these seven countries. For now, it suffices simply to point out the broad motivations for initiating and expanding defense production.

CHAPTER I

ENDNOTES (Pages 1-11)

¹Allister Sparks, "South Africa Promotes Sale of Modern Arms," The Washington Post (September 27, 1982), p. A16.

²"Nonaligned Denounce U.S. for Central American Role," The Washington Post (January 16, 1983), p. A12.

³U.S. Department of State, Conventional Arms Transfers in the Third World, 1972-1981, Special Report No. 102 (Washington: U.S. Department of State, August 1982), pp. 7-9.

⁴Andrew J. Pierre, The Global Politics of Arms Sales (Princeton, N.J.: Princeton University Press, 1982), pp. 123-127.

⁵Robert D. Shuey, The Propagation of Arsenals: Implications of the Transfer of U.S. Military Production Technology to Newly Industrializing Countries (Washington: National War College, July 14, 1980), pp. 1-4.

⁶Statistics used here were derived from United States Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers, 1970-1979, (Washington: U.S. Arms Control and Disarmament Agency, March 1982), pp. 1-33.

⁷United States Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfer, 1969-1978 (Washington: U.S. Arms Control and Disarmament Agency, 1980), p. 19.

CHAPTER II

MIDDLE EAST AND SOUTH ASIA: ISRAEL AND INDIA

Israel

Among all developing, including industrializing, countries, Israel has come closest to becoming self-sufficient in arms production. Despite being a small country with almost no natural resources, an economy struggling to keep from bankruptcy, and a recent rate of inflation that exceeds 100 percent annually, Israel has built the capacity for producing much of its armaments. Necessity compels such a policy. Surrounded by hostile Arab neighbors, which with the exception of Egypt remain in a technical state of war, Israel must devote over a third of its annual budget to defense.¹

Israel's policies governing military procurement contrasts sharply from those of other Middle Eastern and Third World countries. As suggested, only Israel operating at times under siege conditions, views military procurement as vital for its survival. The Israelis do not manufacture military hardware for prestige or display purposes, or even just to earn foreign exchange, but for its potentialities in war.²

Until June 1967 Six Day War, the majority of equipment in the Israeli Defense Forces (IDF) was of foreign origin, chiefly British, French and American. Because Israel had a relatively advanced industrial base, it could build up a defense industry. As early as the late 1960s, Israel achieved self-sufficiency in small arms and could produce most of its spares and ammunition requirements. Only in the 1973 Yom Kippur war when expenditure

rates exceeded expectation did Israel have to import large amounts of ammunition. In addition, Israel soon embarked on a program to overhaul, maintain, and repair most of its weapons. In fact, Israeli engineers have a long history of successfully modifying weapons purchased abroad or captured on the battlefield during one of its wars.

The 1967 War proved a watershed in the history of the Israeli military-industrial complex. France's sudden imposition of an arms embargo prompted the Israelis to drive toward self-reliance in arms. That drive gained such momentum that today the country has a military research, development, and production capacity that leads all other Third World countries. Many Israelis ironically thank the French President Charles de Gaulle for his "major contribution" in advancing Israel's defense industry through his embargo decision.³

In 1969 the then director of Israel's Military Industries, Yitzhak Ironi, commented that, "We have doubled manpower and tripled production since the Six Day War. We were not surprised by the extension of the French embargo in January 1969, since we began to tool in May 1967 and have prepared dies for the most critical items. When (sic) we cannot buy abroad, we will make ourselves, and there is nothing we cannot produce in the way of arms, ammunition, and accessories in the next 12 to 15 months."⁴

Israel's Defense Industries

Given Israel's national security requirements and continuous balance-of-payments difficulties, the country naturally sought to develop

defense industries. Domestic production would reduce foreign exchange costs, would increase control of supply, and would permit adaptations of equipment to meet Israeli requirements. Because Israel had a substantial number of well qualified scientists, engineers, and technicians as well as a growing industrial base, it could risk increasing dependence on local production of military items. Today, Israel's defense industries lead the growth in the country's manufacturing sector.⁵

The military industrial complex of Israel includes over 200 public and private firms, but four government-owned companies, operating under the Ministry of Defense, dominate production. Israeli Aircraft Industries (IAI) has emerged as the largest and most important company. The company, organized in 1953 by Albert Schwimmer, a former TWA flight engineer, to overhaul and service aircraft of the Israeli Air Force, has become a potent economic and diplomatic weapons in Israel's struggle for survival.⁶ Over the years it has evolved into a enterprise employing over 25,000 people (the largest employed in the country) and manufacturing over 400 different military and civilian products. Although still government-owned, IAI is now organized and operated as an independent company with a profit motive. Among other items, IAI and its subsidiaries produce aircraft, engines radars, remotely-piloted vehicles, missile systems, fast patrol boats, and armed reconnaissance vehicles. Not only does it produce to supply Israeli armed forces, but has become a significant contender in the world's arms trade, presently deriving more than 60 percent of its annual sales from exports.⁷

A short history of the company proves instructive. IAI originated at a

time when Israel experienced great difficulty in acquiring spare parts for its air force. Consequently, during the 1950's IAI's chiefly focused on manufacturing spare parts. It then progressed to performing overhaul work on aircraft of numerous foreign airlines as well as on military aircraft of the French and U.S. Air Forces. By the late 1950s, IAI began to show great interest in developing a capacity to manufacture aircraft. As a first step, it secure a license to produce the French Fouga Magister jet trainer. Production of the French Magister started in 1960. By then the staff of IAI had grown to some 2,000.

Some of the employees had come from Israel's automotive industry, but many came from foreign aircraft companies. Al Schwimmer, IAI's president, served with Trans World Airlines, following his education at the Massachusetts Institute of Technology and the California Institute of Technology. The company's chief engineer, Erich Schatzki, also a U.S. citizen, had worked as an engineer at Junkers, Fokker, and Heinkel in West Germany and at Republic Aircraft Corporation in the United States. The Minister of Defense (former Ambassador to the United States) Moshe Ahren previously served as a past president of IAI. As a U.S. educated aeronautical engineer, he headed the team that developed Israel's KFIR fighter. It is quite likely that most of the aircraft industries of Europe and North America supplied personnel to IAI.⁸

Israel also initiated efforts to train its own nationals for the aircraft industry. Israel's chief technical institute, the Technion in Haifa, instituted four year courses to expand the size of the skilled labor force.⁹

In the early 1960s, IAI reorganized into a number of divisions, corresponding to the various areas of specialized aeronautic technology with which the enterprise had become involved. The major departments became engineering, aircraft manufacturing, electronics, combined technology and Bedek (the overhaul division). Since its founding, Bedek (which means overhaul and repair in Hebrew) has inspected and overhauled both military and commercial aircraft, both domestic and foreign. Until recently Israel overhauled U.S. aircraft stationed in Europe and the United States still ships engines of military aircraft to Israel for rework. In its operations, Bedek uses the most advanced inspection techniques, maintenance and repair methods as well as a computerized management information system. It currently services some 60,000 components, accessories, and systems of about 8,000 types in its three sub-divisions responsible for airframes, engines, and components. Its activities range from line service to depot level overhaul.

IAI's manufacturing division has responsibility for aircraft production. Since its inception, the division has produced Magister, Ariva, Commodore, and Westwind executive jet aircraft in addition to the KFIR. Reportedly, it soon will begin producing the controversial fighter bomber, the LAVI. Although this program triggers debate, Moshe Ahren's appointment as Minister of Defense puts an advocate of the craft into a key decision-making position. Despite the cost, Israel probably will push ahead with the aircraft's production. This division also engages in manufacturing projects for other Israeli military agencies, either directly or as a sub-contractor.

IAI's engineering division, the largest engineering establishment in Israel, employs over 2,000 graduate engineers, experienced technicians, qualified scientists, and skilled workers in developing advanced aerospace, naval and military systems. Attuned to the state-of-the-art and future needs of a technology-oriented world, the division's in-house capability for high quality independent research remains strong. The engineering division designs, develops, and tests new tri-service (air, ground, sea) products, initiates and conducts in-depth research as well as supplies analytical services and technology development know-how to other industrial establishments both in Israel and abroad.

IAI's electronics division is composed of five subsidiary companies, including: (1) ELTA, Electronics Industries; (2) MBT, Weapons Systems; (3) TAMAM Precision Instruments; (4) M.L.M., Systems Engineering and Integration Plant; and (5) MAGAL, Detection and Alert Systems. This division possesses considerable potential for conceiving, designing, and producing new generations of electronic systems. Its GABRIEL surface-to-surface missile has received extensive and favorable publicity worldwide.

The Combined Technologies Division consists of six subsidiary firms, all certified by the aeronautical authorities of among others, Israel, the United States, Canada, Great Britain, Switzerland, and West Germany. These companies include: (1) RAMTA, Structures and Systems; (2) SHL, Servo Hydraulics; (3) PML, Precision Mechanisms; (4) ORLITE, Engineering; (5) GOLAN Industries; and (6) MATA Helicopters.¹⁰

The second major government-owned producer of military hardware and the largest user of manpower is Israel Military Industries (IMI). The company, made up of over twenty small subsidiaries, produces over 90 percent of Israel's ammunition needs and 100 percent of its small and medium weapons.

Fabrique Nationale of Belgium (FN) played an important role in developing this industry. In 1961, FN received a license to build the C-121 submachine gun designed in 1951 by an Israeli general (GALIL). In return, IMI acquired a license to build the 7.62 mm FN rifle. In addition, IMI and its subsidiaries produce mortars, heavy artillery, and since 1972, tanks.

Israel Shipyards, Ltd., of Haifa represents the third largest government-owned or controlled military industry.¹¹ The firm currently employs approximately 2,000 personnel. It is expanding its productive capacity by constructing floating drydocks and is preparing to repair supertankers up to 60,000 DWT as well as to build submarines and corvettes up to 1,500 tons. However, to date its major effort has been the construction of guided missile patrol boats (especially the RESHEF) for Israeli and other Third World navies.

Probably the least known of Israel's military production facilities is the Armament Development Authority, commonly known RAFAEL. This Authority prides itself in finding diverse solutions for various high technology defense problems. It becomes a leader in chaff electronic countermeasures for anti-missile defense, and has designed and marketed several types of military hardware such as: (1) the SHAFRIR air-to-air missile systems with its combat proven 60 percent kill ratio; (2) the DAVID artillery computer; (3) an analogue aircraft weapons computer; and (4) the TAL cluster bomb.

RAFAEL employs about 5,000 scientists and engineers in its Haifa research facility and has proved able to successfully reverse engineer designs and prototypes obtained from others.

Although government-owned firms remain the largest employer, the vast majority of defense-related plants in Israel belong to the private sector. Some of these firms employ thousands while others operate with a handful of people. The Israeli Defense Ministry founded some of these companies which subsequently became public corporations when they sold shares on various international stock exchanges.

Today, so-called "advanced" or "high-technology" weapons systems differ from older generation equipment chiefly in terms of the amount of electronics employed. Israel has opted to build up a strong defense electronics industry and now can satisfy not only much of its own needs, but also those of foreign countries. For example, it can supply radar, communications, electronic warfare and missile guidance equipment.¹²

One of the largest non-governmental defense industries is Elbit Computers, Inc., an electronics oriented "think tank."¹³ Israel accurately came to view high technology as its life-line to progress, an economic pursuit that can help offset a massive inflation rate and create solid export markets to balance the import burden. In the 16 years since its establishment, Elbit has gained a world-wide reputation in designing, developing, manufacturing, selling, and servicing computer-based systems and products for both military and civilian uses. It currently employs about 2,000 people. The company describes itself as a "systems house" and 40 percent of its employees pursue

engineering activities. Founded as a joint Ministry of Defense and commercial venture, (Elron Electronics Industries, Ltd.), the firm initially concentrated on developing military systems and producing a minicomputer, one of the first of its kind in the world. In 1977 Elbit became a public company, selling its stock on the Tel Aviv Stock Exchange. At present, 69 percent of Elbit stock is owned by Elron or its U.S. parent company, Control Data. The public and employees hold the remaining stock. Elmar, owned fully by Elbit, deals in computer-based medical systems while Eltam, 45 percent Elbit owned, designs, manufactures, installs, and maintains telephone and other communications systems. Eltec, two-thirds owned by the parent company, manufactures printed circuits boards sold to Elbit and electronics companies in Israel and abroad.¹⁴

The third largest employer (after government-owned IAI and IMI) is a company called Tadiran. General Telephone and Electric (GTE) and in the United States and Koor Industries in Israel own the company. This firm employs about 8,000 people and with Elta (and other IAI electronic subsidiaries) accounts for some 80 percent of the electronic output of Israel.

Specific Arms Developments

It now remains to review some of the specific weapons and systems that Israel's industry produces. Overall, one cannot but be impressed with the wide range of high tech items coming out of the country's production facilities and laboratories.¹⁵ Inasmuch as IAI has spearheaded Israel's remarkable growth in defense production, one could profitably begin by examining the

output of that company. Several of their accomplishments merit mention, including:

GABRIEL missile system - This surface-to-surface missile systems became the first combat tested sea skimmer missile system in the world. IAI has developed three versions: (1) the MKI with a range of 20 kms; (2) the MKL with a range of 40 kms; and (3) the 36 KM-range MK3 with an active radar seeker replacing the semi-active homing unit carried in MKs 1 and 2.

RAM V-1 Scout Car - This multi-mission infantry support vehicle is considered ideal for tank hunting with its 106mm recoilless gun and provides an excellent weapon platform for anti-aircraft defense with its 20mm cannon. Ground forces use this vehicle extensively for long range reconnaissance, command and control, riot control, and border patrol.

KFIR aircraft - The C-2 version of the KFIR represents a marriage of the beauty of the French Mirage III airframe and the power of the U.S. J-79 (Phantom) engine. The C-2 KFIR, tested in combat over Lebanon in 1982, is a two-seater fighter that the Israelis believe has proven an ideal solution to the demands of modern air combat in which, according to their views, one man cannot do everything. The C-2 performs a multi-mission role and

has the capability of meeting present and projected requirements for air combat, point defense, and ground support missions for reportedly less than \$6 million per copy.¹⁶

ARAVA - This aircraft is both rugged and versatile. The Israelis designed it for use with both military and civilian operations. In its military role, the aircraft performs missions that helicopters and conventional aircraft cannot accomplish effectively. ARAVA can transport 24 fully armed troops or police, 18 paratroppers, 20 passengers, or 12 stretcher cases. It has been called a flying pack mule which can carry awkward loads up to 2.3 tons.

WESTWIND Series aircraft - IAI considers these aircraft a leading contender in the corporate jet market. The Israeli Navy uses a Sea Scan variant for performing maritime reconnaissance and for over-the-horizon targetting.

Airport Surveillance Radar - EL/M-2215 is a modern, state-of-the art radar for controlling the airspace in the vicinity of major airports.

Other items produced by Israel's defense industries include:

MERKAVA (Chariot) Tank - IMI takes pride in its development of this tank, designed to meet Israel's

particular combat requirements demonstrated during the 1973 war. Israeli tank developers proudly point to their significant achievement to build from scratch the industrial infrastructure (especially in metal working) required to support the construction of this tank and its outstanding armor protection. The MERKAVA proved to be an effective fighting vehicle during the 1982 Lebanese War.

Field Artillery - The Soltam Corporation, a leading producer of artillery pieces, has come up with some of the most popular Israeli designs, including the M-71 155mm gun/howitzer, the M-68 155mm howitzer, and the L-33 self-propelled 155mm gun/howitzer.

SHAFRIR Air-To-Air Missile - Rafael produces a version of the Sidewinder missile - based primarily on reverse engineering of Soviet and U.S. missile systems primarily to the U.S. Sidewinder.

Missile Boats - Israeli Shipyards, as noted, produces the RESHEF class and follow-on ALYIA class guided missile patrol craft. The RESHEF, with its GABRIEL missile system proved highly effective in combat during the Yom Kippur War of 1973. The ALYIA maintains a helicopter recovery capability, having landing and hangar facilities. In addition, the ALYIA enjoys

significant firepower, including GABRIEL and HARPOON surface-to-surface missiles.

Small Arms - Israel's IMI produces the world renown UZI 9mm submachine gun, the GALIL 5.56mm/7.62 assault rifle, and all smaller arms ammunition from 5.56mm through 50 caliber.

To reach self-sufficiency Israel must achieve the capability to produce two military items - jet aircraft and tank engines. Well aware of its deficiency in jet engines, Israel is considering actions to remedy the situation. It now has companies dedicated to various aspects of jet engine development such as Bet Shemesh for engine components, Carmel Forge for forged parts, USCAR for precision forged and machined gas turbine blades and compressors, and MITM for various engine parts. Although the very high costs associated with designing and building jet engines might cause Israel to reconsider such an expensive undertaking, overriding political and military objectives most likely will continue to propel the country into such an enterprise.

Exports

Israel probably constitutes a unique country within the Third World in its wide range of defense production. However, it recognizes the vital necessity of exports if the country wishes to maintain a competitive defense industry and to secure the needed funds to keep that industry at the "state-of-the-art." Israeli defense industries expected to sell over \$1.25 billion in

1981.¹⁷ Israel today exports over 50 percent of its local arms production.

In 1980 arms sales totaled \$1.2 billion, a third of which came from purchases by Argentina and El Salvador. Sales to other Central and South American countries have escalated since that date.¹⁸ The leading arms producer, IAI, achieved exports of some \$520 million 1982, about \$170 million more than in the previous year. For the first time, IAI sold over the \$500 million mark. In that same year, over 70 percent of IAI's revenue came from export sales.¹⁹ The GABRIEL missile system stands as Israel's greatest defense export success. Today, it ranks with the French EXOCET and the U.S. HARPOON as one of the three best sellers in the field. GABRIEL, at \$300,000 per copy costs less than half as much as its competitors. Israel has exported over 1,000 GABRIELS to at least 9 countries while several other nations are believed to have ordered the system.²⁰

The Israelis also have exported RESHEF patrol boats, at least 6 to South Africa and two to Chile. For its part, South Africa now is building RESHEF boats under Israeli license, a development that Israelis would like to repeat in other parts of the world.

Overall, Israel exports to some 54 countries and gains 2 to 3 new markets each year. Since IAI now sells electronic warfare equipment for export for the first time, many potential foreign customers have made inquiries and it is likely that other nations will become interested in that aspect of Israeli defense production.²¹ The United States and several NATO nations, including Italy, reportedly are again purchasing Israeli manufactured military hardware. The Italian Air Force seems very interested in the ELTA 2021 (look

down-shoot down) radar for its future AMX strike fighter. An unnamed Latin American country (probably Brazil) has expressed interest in co-producing the radar under license. Israel also has the potential for further exporting to the United States. General Dynamics might "buy back" \$300 million worth of Israeli aviation equipment for installation in the F-16.²² It should be noted that a Memorandum of Understanding (MOU) resulting from the Egyptian-Israeli Peace Treaty opened the possibility for the United States to purchase Israeli equipment despite its policy of "Buy America." Israel wants the United States to buy, at a minimum, mortars, assault rifles, ammunition, and thermal sleeves for U.S. tank guns.²³

Israel also is interested in increasing commercial transactions from industries doing defense work. For example, Elbit Computers strives to shift its emphasis from military to commercial work, from some 60 percent military to a goal of only half.* In 1981 the company exported almost 50 percent of its products and expect to increase beyond 50 percent in 1982. It also anticipated exporting over \$700 million worth of products in 1983, about a 20 percent growth over 1982 sales. Its major foreign markets are in South America, the Far East and the United States,²⁴ but it now has targetted Western Europe. The company believes that Israel enjoys two advantages in its drive to sell to the West Europeans: (1) attaches no political strings to its sales; and (2) it does not "sell and forget" as do some of its competitors.

*Statement by President of Elbit Computers, retired Chief of Staff of the Israeli Air Force, General Benjamin Peled. Interview by the Editorial Staff of Military Technology Magazine during spring of 1982 in Carmiel Israel.

Regional Implications

Israel's decision to emphasize arms production largely stems from its geographic situation. It lives surrounded by Arab states, most of which are hostile. Israelis view the 35-year struggle with the Arabs as a matter of survival. They truly fear the possible destruction of the Jewish state. Consequently, the Israelis have made national defense their first priority, devoting more human and economic resources to defense, per capita than any other nation in the world. Yet, no matter how strong its defense posture, Israel cannot permanently defeat its Arab enemies. Past victories have brought only temporary respite from Arab political and military pressures. Because permanent military victory remains impossible, Israel must deter its enemies through decisive, temporary victories. This situation will continue until Israel and its Arab neighbors reach a peace accord.

Arms and the securing of arms have occupied Israel since the inception of the state. At first Israel took arms wherever it could find them, including communist countries during its war of independence of 1947. During the 1950's it looked to Western powers, especially Great Britain and France for arms. France's 1967 decision to cut off arms sales to Israel provided the Israelis with a bitter lesson. Israel's leadership decided that the country must strive as much as possible to rely on its own military power, and hence on its own arms production. Because armaments caused heavy economic burdens, the Israelis had to increase their dependence on outside sources of funds to support such an undertaking. They especially turned to the United States and to world Jewry for help.

In the early days of their armaments development, Israelis pushed for co-production as an inexpensive way of fashioning indigenous production capabilities. For the past decade, Israeli governments increasingly came to link closely weapons production with national security and freedom of action. The British cut-off of spare parts for Centurian tanks during the Yom Kippur War reminded them of France's embargo six years earlier and reinforced their determination to seek arms self-sufficiency. U.S. pressure on Israel in the latter phases of the 1982 Lebanese War also helped convince the Israelis to prepare, if need be, to "go-it alone."

In addition, Israeli, although largely isolated within the Third World, has long wished to establish firm and friendly relations with developing countries. Before African countries broke relations within the past decade or so, Israeli used military missions to help cement such ties (as in Ghana and Zaire, for example). Weapons sales have proved for the major powers an effective device for improving their relations with Third World countries. Israel began to see similar possibilities. Hence, exports of arms to Latin America and Africa grew and with it, Israelis hoped, Israel's isolation in the Third World would lessen.

Self-sufficiency in arms production also offered Israel a chance to conduct a more independent foreign policy. Israel also resented the strings that came attached to any foreign arms agreement. It had become painfully aware that weapons based on U.S. designs and technology could not be exported without the permission of the United States. Although Israel's general arms coincided with that of the United States, some of its specific policies and

ways of achieving overall goals, differed. Therefore, Israel's political leadership began to feel that anything the country could do to reduce or eliminate restrictions to its exercise of power would prove beneficial in the years ahead.

The economic implications of this position are obvious. Once Israel decided to expand its production capability it required heavier financing and, thus, ironically it increased dependence on the United States for funds. Start-up and R&D costs required to establish and build a viable arms production capability proved extremely high. Maintaining a strong military places a tremendous resource burden on the people. Today defense consumes over a third of Israel's GNP and some 40 percent of its annual budget.²⁵ On the other hand, a strong domestic arms production capability, with its export potential, lessens the balance of payment problems and provides high-technology jobs for educated and skilled Israelis. In recent years the country has applied the principle that all projects must prove themselves either commercially profitable, especially in earning foreign exchange, or of definite military value. Unlike other countries, Israelis give short shrift to considerations of prestige.

In economic terms, the Israeli arms industry currently is embarking on probably the most ambitious aircraft development program for a country its size in the world. The Israelis committed some \$550 million in its 1982 budget and expect that overall development will cost \$1.25 billion in current dollars. Whether this large expenditure is economically feasible remains open to debate. The president of IAI has categorically asserted that Israel could

not afford to develop and acquire the LAVI aircraft economically, but that it cannot afford not to build it on military or political grounds. "Who," he asked, "has not imposed an embargo on us at one time or another?"²⁶ IAI can provide the necessary technology, including perhaps engine development, but still cannot produce the aircraft without outside help. For example, IAI has opened a composite materials facility, but has suggested that if it can buy composite materials more cheaply from foreign sources, it will do so. Nonetheless, the Israelis are developing their own domestic production potential first, thus removing, or at least reducing, the problems of a future embargo. They probably will follow a similar policy in regard to jet engines although the Pratt Whitney 1120 engine will probably power the LAVI. At a minimum, the IAI facility at Bet Shemesh will produce the engine under license.²⁷ It probably will be only a matter of time (and commitment) before Israel has a total jet engine production capability.²⁸

National Security Implications for the U.S.

A strong, democratically in the Middle East is in the national interest of the United States. Over the past 15 years, the United States, to some degree, has been able to use its role as Israel's arms supplier to influence Israel's military policies. Fear of a possible cut-off of arms at the end of the Yom Kippur War in 1973 no doubt helped convince the Israelis to refrain from attempting to destroy the Egyptian Army in the Sinai. Of course, the United States has found that even as Israel's chief arms supplier, it could not dissuade the Israelis from undertaking some military actions of which it

disapproved. Yet, the fact remains that the more Israel becomes self-sufficient in arms production, the less the U.S. influence will become. One should not conclude that Israeli self-sufficiency soon will eliminate U.S. influence. Israel has a long way to go before it can achieve true self-sufficiency and this nation still can bring to bear powerful military as well as economic, political, and moral assests.

For its part, until recently the United States gained militarily from Israel's armaments activities because the technologically proficient Israelis were willing to share technological advances gained from defense development and production. Just as important, they provided U.S. weapons developers and intelligence officials with information concerning the performance of weapons used in real combat conditions. Since the war in Lebanon, however, the flow of information has faced acute problems. Israel seems to increase its quid pro quo for providing information about the performance of Soviet weapons during that conflict, and especially about the ECM that proved so effective against Soviet-made Syrian missile systems. It reportedly wanted co-production and export rights of U.S. equipment developed on the basis of this information as well as detailed data on several U.S. weapons. Such Israeli proposals would complicate relations of the United States with its NATO partners and violate U.S. laws retriecting the export of U.S. technology to third parties. Assuming political relations between the two countries do not deteriorate, over the long run, both countries will probably find a solution to this issue.

Politico/economic factors prove equally important in determining U.S. attitudes toward Israeli defense production. The United States resists the spread of high technology weapons to certain countries, especially in the developing world. Yet, Israel realizes that to maintain an economically sound defense industry, it must export. Heretofore, licensing arrangements enabled the United States to authorize or disapprove the sale of a military item incorporating U.S. technology. For example, in 1978 the U.S. Government announced that it would allow Israel to sell 60 KFIR aircraft to Taiwan. This country had the right to approve the sale because the KFIR was powered by the General Electric J-79 (Phantom F-4) engine. In this case, U.S. restrictions on third party sales applied. The previous year the United States had turned down an Israeli request to sell the KFIR's to Ecuador because this country did not want advanced jet aircraft in Latin America. The French subsequently sold Ecuador the Mirage aircraft. In permitting the sale to Taiwan (which subsequently opted not to buy the aircraft) the United States sought to improve relations with both countries while avoiding problems with the PRC. For Israel, the deal would have provided several advantages. First, Israel would have gained an estimated 500 million sales, a needed economic boon for an hard pressed country. Second, it would have propelled Israel into the world military aircraft market, being the first overseas export of an Israeli fighter.

Expanded Israeli arms exports could have important economic consequences for the United States. Such exports help Israel in reducing unemployment and earning foreign exchange. At the same time, Israel's inexpensive labor allows

that country to underprice U.S. arms. Reduced costs of production coupled with the operational experience that the Israelis have with weapons make Israel a potent competitor. In fact, many buyers of defense hardware believe that if Israel developed a military item, it must be fit for combat duty. Moreover, the close working relationships between the Israeli military forces and its defense industries adds to Israel advantage as an arms seller. The exchange of know-how between the Israeli Defense Forces and the country's arms manufacturers is more intimate than in any other country. Both technical personnel and key managers are ex-service officers who talk the same language as those who formulate weapons specifications. Most of these have had recent combat experience. Thus, the feedback between users and developers is very effective and, in fact, constitutes a marketable commodity in many arms markets, especially in Latin America and Africa.

In sum, the United States enjoys both attractive opportunities and confronts serious problems associated with Israel's growing arsenals. The opportunities include: (1) probable continued U.S. access to Israeli technological discoveries and improvements; (2) a militarily strong Israel, no matter the source of arms, supports U.S. efforts to secure peace in the region; (3) a ability to use Israeli-produced weapons to supply nations that this country prefers not to arm directly; (4) in case of a major war, an additional defense industry source that the United States could tap, if need be, to expand rapidly its war instruments and supplies.

The problems that a growing weapons production in Israel pose include:

- (1) less U.S. control over Israeli political and military actions;
- (2) disenchantment by Arab nations with the United States for either assisting or permitting, in their eyes, such Israeli achievements; and (3) increased Israeli competition in world arms trade, especially among the smaller developing countries.

India

In October, 1962, just 15 years after independence, India's military defeat at the hands of the Communist Chinese, led to a fundamental change in Indian defense policies. Prior to 1962, India worried only about its traditional enemy, Pakistan, fearing only the military efforts of the Pakistanis. The country's leaders judged nonalignment and diplomatic efforts adequate for protecting India's other security interest.²⁹ India discovered that it had to defend on two fronts. An increased threat that required increased emphasis on defense planning a strengthened military establishment, and, important for our purposes, a larger and more advanced defense industrial base. The Indians have continued to give these three objectives a high priority. These three cornerstones of Indian defense policy have remained valid over the ensuing years because India came to believe that a policy of nonalignment still requires a strong military.³⁰

Looking from the perspective of 1983, India finds satisfaction in the fact that it has implemented much of its defense policies, maintaining a potent military force (the largest in South Asia and the fourth largest in the world),³¹ and growing self-sufficiency in the manufacture of arms. As a

result, India is now the dominant power in the region. That domination enabled the Indians to intervene militarily in the Bangladesh crisis in 1971, achieving their objective of dismembering, and thus weakening, Pakistan. With the creation of an independent coast guard in 1978, India seems to be serving notice that its Navy is now fully a "blue water" force and that India considers the Indian Ocean with its sphere of influence.

One of the few nations of the world to possess an aircraft carrier, India has recently agreed to buy two submarines from the Federal Republic of Germany to complement its aging Soviet built submarine. In addition the country's capability to produce naval vessels of frigate size, provides it the means to extend its influence to the Indian Ocean. Cited as legitimate Indian interests which require a naval presence are: lines of communication with the Andaman and Nicobar Islands,, protection of the maritime fleet, offshore oil, gas and deep sea mining possibilities, and Pakistan's naval force. As a corollary to this, India has attempted to exclude outside military powers from the area by labeling the Indian Ocean a peace zone.

India's efforts and accomplishments in defense production since 1962 have been significant, but have posed problems, and exacerbated its relations with the United States. What the Indians see as U.S. unreliability as a supplier of aid (both economic and military) plus the U.S. policy of providing sophisticated arms (e.g., the F-16) to Pakistan have contributed to tensions between the two nations.³² India's agreement with the U.S.S.R. likewise have helped sour relations with the United States. There is currently no U.S. military aid to India and few commercial sales of military equipment.

The Soviets, on the other hand, have become India's major supplier of arms, both through sales on favorable terms and through licensed production agreements. Furthermore, India has either defended or refrained from attacking Soviet nations in the region and Third World meetings. For example, India's position on Soviet intervention in Afghanistan conflicts with the efforts by the United States and others to achieve an early Soviet withdrawal. Indian and Soviet interests coincide in a number of other areas also: they both wish to limit the PCR's influence in the region and to limit the role of the U.S. Navy in the Indian Ocean. Moreover, both share a general suspicion of the Islamic bloc, particularly Pakistan.³³

Since 1962 there has been a steady expansion of India's indigenous arms industry. India's 1965 war with Pakistan led to an arms embargo by the United States and Great Britain, spurring India's efforts toward more self-sufficiency. These efforts remain an active part of the country's overall defense plan.³⁴ It calls on India to increase technological and production know-how and standardization in order to ease maintenance, provide a more reliable spare parts supply, ensure more freedom from threats of arms embargoes, and therefore make more available options during military crisis or war. For example, better maintenance and more reliable spare parts supply provide India's armed forces with greater sustainability and, therefore, enable the nation's leaders to determine the length of a war free from threats of arms embargoes.

With the world's second largest population, India has a huge and comparatively inexpensive labor force. It also has a great number of university graduates and students in higher education. One source estimates

that "India ranks next to the U.S. and the U.S.S.R. in number of highly trained nuclear scientists."³⁵ This pool of trained individuals provides a rich source of human resources for arms development and production and supports India's efforts to build the basic industries needed to support arms enterprises.

Relations between the arms industry and the government remain close. The Indian Constitution provides that arms production will be in the public sector. The Congress Party, India's largest political party and the party of power throughout most of India's history since 1947, has made the issue a plank in its political platform since before independence. As a result private industry produces relatively few military items and no complete systems.³⁶ In the public sector, under the Ministry of Defense (MOD), about 30 ordnance factories and nine major industrial groups produce everything from ammunition, to field artillery, to jet aircraft, to rocket fuel, frigates. Allied with the industry is the Ministry of Defense's research and development effort that works on projects such as engines for tanks, improved radar, and aircraft design.

India also has programs to develop nuclear energy as well as launch vehicles and satellites for its space program. These programs are not part of the defense effort and not included in the defense budget. It is clear, however, that both nuclear weapons and ballistic missiles are within India's capability, and perhaps in the near future.³⁷ Pakistan also engages in nuclear research and the potential for a future nuclear confrontation presents a real danger.

Defense Industrial Complex

Indian efforts to develop its arms industry and military forces compete for resources with India's economic development plans. Policymakers worry that military expenses will siphon funds away from economic growth and the defense share of the total budget and GNP reflect this concern. Except for the year after the 1962 Sino-Indian war when defense spending reached 4.5 percent of the GNP, the share of GNP has hovered around 3 percent. From 1963-1972 it averaged 3.6 percent,³⁸ falling to 3.04 percent from 1973-1977. As a share of central government spending from 1970-1979 defense spending averaged 18.85 percent.³⁹ For year 1982-83 defense's share of the budget dropped to 17 percent.⁴⁰ These figures show that while important, defense spending consumes only a small part of the country's total economic output.

India has not exported arms in order to reduce the cost of home produced arms. Arms exports have never reached one percent of total exports. In 1978 and 1979 (the last years for which figures are available), arms exports were only one-tenth of one percent of total exports.⁴¹

Some observers believe India is on the verge of becoming a major arms exporter.⁴² There is little available evidence to support this view and information about past or planned sales is scarce. Moreover, a reputation as an arms merchant would not facilitate India's aspirations for a Third World leadership role. On the other hand, as arms costs mount, pressures to export will increase. It is not possible to make a determination on future policies from information now available.

Nevertheless, India has made great strides toward its goal of creating an indigenous arms industry capable of supporting its security policies and has achieved virtual self sufficiency in artillery, mortars, small arms, and mines.⁴³ India's recent interest in naval power has enabled its ship-building industry to build a frigate of indigenous design. As part of its deal to purchase two submarines from a West German company, India plans to build two more under license. It also has the capability to construct offshore patrol boats and the ability to overhaul and modernize its aircraft carrier.

The desire of India for wartime air superiority has prompted it to undertake producing under license foreign weapons design. It also has one launched native design efforts. For example, India recently signed an agreement with France to buy 40 of the advanced Mirage 2000's and to build 60-70 more under license.⁴⁴ At the same time it is also producing the Kiran jet trainer with Indian technology.

Despite these successes, India's arms industry has limitations. In the foreseeable future the military must rely on purchase/license agreements for most high technology equipment. The government has postponed efforts to design and build a main battle tank to replace the Vijayanta (now built under license) because of difficulties with engine development. India has apparently decided to purchase more Soviet T-72 model tanks.⁴⁵ Advanced fighter aircraft also appear beyond Indian capabilities for some years.

Despite any setbacks, Indian arms policy still aims for increased self-sufficiency. Most purchase agreements include arrangements for assembly in India of additional items and eventual production under license with progressively increased Indian contribution to weapons components.⁴⁶

Regional Implications

As previously noted, increased self-sufficiency in arms production provides India with a more assured supply of war materiel, increases standardization of military equipment, and gives India greater flexibility in meeting its perceived security needs. To achieve these security interests, the country requires a power projection capability in the Indian Ocean as well as regional military dominance. Just how much India can expect to improve that power projection capability through increased indigenous arms manufacturing remains uncertain, but there is little debate that India looks to internal industrial sources to supply more of its military power in the future.

Most of its neighbors do not share India's pretensions as the regional leader and a major power.⁴⁶ Therefore, they probably would not welcome any sharp rise in India's defense production, probably believing that such a development would simultaneously reduce the constraints imposed by India's dependence on foreign sources for weapons. Indian ambitions to become the leading power of the region can lead to direct military confrontation, as already happened in the case of Pakistan, (which shared similar hopes) or to a suspicious wariness of Indian intentions as in the case of some of its smaller

neighbors. Thus far, India has skillfully avoided for the most part challenges to its interests and has helped to maintain regional stability because instability might very well bring in the superpowers, an event that India fears and strives to prevent.

Conversely, Pakistan considers Indian military power a major threat, and in its efforts to create a counterweight, has sought outside military assistance, chiefly from the United States. One observer describe the confrontation as a "veritable arms race."⁴⁷ There is little question that mutual and deep-seated suspicion drives both countries to increased arms spending. India considers a weakened Pakistan important to its security and Indian intervention in the Bangladesh crisis of 1971 indicates India's willingness to use military force when it feels vital interests affected. Yet, thus far only India has developed considerable defense production capabilities. As it improves that ability it likewise expands its freedom of action in dealing with Pakistan. In case of a war, a more self-reliant India would hold a definite advantage over Pakistan almost totally dependent on outside sources for arms, spare parts, ammunition, and other war reserves.

Nations on the periphery of the region such as Thailand, Singapore, and Malaysia, all members of the Association of Southeast Asian Nations (ASEAN) oppose Indian recognition of Vietnam's position in Cambodia. However, most probably India's efforts for increased arms production have little immediate impact on this situation. On the other hand, a growing Indian arsenal has relevance for its other neighbor, the PRC. Ever since the Indo-Chinese War of 1962, the Indians have increased military readiness near the common border.

Although that border has been relatively quiet for years, the PRC, like Pakistan, probably feels concerned about any industrial growth that would grant the Indians greater strength and flexibility should armed hostilities again erupt.

India's drive for military regional leadership stems more from internal motivations than from the policies of other countries. India seeks a leadership role because its decisionmakers believe that a country of its size, population, resources, military strength, and, important for our purposes, industrial potential, should be the premier nation in the region. Evidence abounds that the Indians view themselves in such a light. For example, one highly-placed Indian has used the term "great power" to describe India's regional role.⁴⁸ Inasmuch as India's neighbors resist such pretensions, they naturally seek increased economic, commercial, cultural, and even military links with nations inside and outside the region, usually with the PAC or nations of the West. Thus far, Western nations have not tried to help nations of the region to build defense production capacities, limiting their assistance to the sale of military end items. In the future, this situation might change. Conceivably, in the coming decades Western countries might assist Pakistan to build its own defense industry, in the process creating an industrial counterforce to that of India's.

In summary, an increased indigenous arms industry has given India greater flexibility and more military options for carrying out policies designed to protect its regional interests. To date, that productive capacity does not prove critical, but could become so in the years ahead. This greater freedom

from outside constraints has the potential of a leading India to policies that increasingly would conflict with those of other nations in the area. Over time, it could prompt others to develop their own indigenous defense production capabilities, especially in the case of Pakistan.

U.S. Security Interest

Although the United States and India share some common aspirations and ideals, Indian interests often conflict with U.S. interests in the region. The Indian Ocean represents a strategic link in the access routes to Persian Gulf oil, a commodity vital to the United States, and especially to its major allies such as Japan and the countries of Western Europe. Indian efforts to create a peace zone in the Indian Ocean,⁴⁹ and the potential to command the western approaches to the Malacca Straits from the new Indian base in the Andaman Islands runs counter to U.S. interests. The Indians resent the U.S. base at Diego Garcia as well as U.S. military aid to Pakistan. A strong and independent Pakistan remains crucial to U.S. interests in Southwest Asia and the Middle East.

In contrast, Indo-Soviet interests often mesh both in the region and globally. Both countries want to limit the U.S. presence in the Indian Ocean, to weaken Pakistan and its links to the Afghan rebels, and to strengthen India's role and position on issues in Third World councils. Additionally, India regards U.S. relations with the PRC with suspicion.

These difficulties no doubt account for the lack of U.S. assistance in helping India build its defense industries. India apparently does not wish

such aid and the United States sees little gain in offering it. India has opted for Soviet links in its defense production as well as for arrangements with Western European countries. Should India ever decide to seek arrangements for the production of U.S. weapons, the country's Soviet industrial connections would pose a major hurdle. In the meantime, the United States sees no reason to make India's industrial arrangements with the Soviet Union an issue; as a sovereign nation India has the right to seek defense industrial assistance anywhere it wants.

Nor has the United States publicly expressed fears that increased indigenous weapons manufacturing by India would damage U.S. interests in the region. It naturally prefers that India and Pakistan as well as India and the PRC avoid future conflict. It would confront a major foreign policy challenge if Pakistan were to request defense production assistance. It would have to decide if its interests were sufficiently affected to help trigger what would surely become not only an arms race, (based on imports) but an arms production race, a contest that would reduce United States capabilities to influence the course of a war should it break out.

CHAPTER II

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CHAPTER III

LATIN AMERICA: ARGENTINA AND BRAZIL

Argentina

The trend toward indigenous arms production is most apparent in the Latin American countries of Argentina and Brazil. Both nations have a potential of becoming important regional arms merchants. Argentina, because it confronts what it considers are immediate and most serious international controversies, is especially sensitive to the status of its military power. Despite its defeat in the Falkland Islands, the Argentines still put great store in their military prowess. One Argentine proudly wrote, "Argentina has proved that it can wage war with dignity and can put the world's number three military power in a tight spot, not to mention that the latter (was) helped by the world's number one military power."¹ This attitude underscores Argentine's determination to do all that it can to strengthen its military forces, including fashioning and augmenting its own arms industry to reduce dependency on others. It seems committed to increase arms self-reliance so that potential policy differences (e.g., over human rights and territorial disputes) with foreign arms exporting countries will again make unavailable needed military equipment as happened in the Falkland Islands war.

Until the early 1970s, many considered Argentina as the development model for all of South America due to its natural riches and the relatively high state of its cultural and technological development. During the administration of Juan Peron it emphasized a nationalistic foreign policy commensurate with the development of a strong domestic arms industry. Unfortunately, the

strong nationalistic policies of Peron and succeeding Argentine governments kept out foreign military development. At the same time it created a large, overstaffed, and highly inefficient domestic arms monopoly.

As Argentina's industrial development began to falter, Brazil's economy experienced exceptional growth and quickly overtook Argentina as South America's industrial model. By the early 1970s, the Argentine armed forces were equipped mostly with foreign procured weapons due to an ineffective domestic arms industry. Concurrently, internal insurgency threatened the very survival of the nation, traditional rival Brazil had achieved considerable economic and military strength, and neighboring Chile was disputing territorial boundaries.²

The 1973 return of Juan Peron, the domestic turmoil following his death, his wife's assumption of the presidency, and the start of a strong internal insurgency, caused the military to delay proceeding rigorously with building a domestic arms industry. By the time the military had overthrown Mrs. Peron's government in 1976 and defeated the internal insurgency in 1977, relations with the United States had cooled over human rights violations. U.S. disapproval injected another consideration in the question of an Argentine domestic arms industry.

The present status of the domestic Argentine arms industry reflects traditional concern for regional security. While recovering from the Falklands war, Argentina is closely watching the development of the Brazilian arms industry. Concern over Brazil's expanding arms production has spurred Argentina to improve its own arms industry. However, the country's immediate need for large amounts of modern hardware has forced Argentina to expand its

acquisition of foreign weapons rather than to pour available funds into a domestic industry. The Argentine government, however, does recognize the long-term need for a domestic arms industry to reduce country's reliance on foreign arms purchases.

Defense Industry

Military production in Argentina began in 1923. In that year Argentine law established a group of military factories with the aim of making military production independent of foreign supplies. In 1941 a new law created the totally autonomous Direction Generale de Fabricaciones Militar (Directorate General of Military Production) which has directed production of military goods ever since.

In comparison to major arms producers, Argentina has a small defense industry accounting for only 0.9 percent of the GNP.³ It can produce limited quantities of mostly unsophisticated material, and remains heavily dependent on foreign license arrangements for production, technical assistance, and management. Nonetheless, Argentina conducts a broad range of defense manufacturing programs including tactical support aircraft, anti-tank missiles, submarines, light armed vehicles, tanks, ammunition and small arms. Argentine-produced defense equipment has been exported to such countries as Bolivia, Paraguay, Peru and Uruguay. Additional items have turned up in El Salvador, Honduras and Nicaragua.⁴

The Argentine government controls most military production and research facilities. In fact, the industry has been called the "old boys club" of the military. The military runs some 80 percent of the industry.⁵ Private sector involvement is very limited. However, Argentina has taken some steps

to make the military-controlled Fabrica Militia de Aviones (FMA)--Argentina's largest aircraft industry--a private enterprise.⁶

The government's Fabricaciones Militares--FM (Military Factories Directorate) produces ground forces material. The Army operates FM as a state-owned enterprise under the direction of the Ministry of Defense. FM has gathered an impressive array of organizations under its wing, including at least ten factories producing ground forces equipment. These factories are capable of producing pistols, rifles, mortars, recoilless rifles, rocket launchers, aircraft rockets, ammunition, military explosives, transport vehicles and military telecommunications equipment. Yet, Argentina depends on licensing arrangements with foreign countries to gain designs of many of its weapons. Thus far, the arms industry in Argentina has exported relatively little. In 1982 Argentina faced political difficulties in carrying out its plan to export the indigenously produced TAM (Tanque Argentino Mediano) medium tank.⁷ The TAM, based on the design of the West German "Marder" mechanized infantry combat vehicle, is armed with a 105mm cannon, two 7.62 machine guns (one coaxial) and a smoke grenade launcher. Argentina manufactures both the cannon and turret locally.⁸

The government owns and administers the two Argentine shipyards that construct and/or assemble naval ships. The Ministry of Defense controls the AFNE shipyard in La Plata while the Argentine Navy and Ministry of Public Works operates the Tandanor Yard in Buenos Aires. Both yards also engage in commercial activities, including building and repairing merchant ships.⁹

In general, Argentina's shipyards indigenously produce relatively small, unsophisticated naval ships. The Navy has had to rely on foreign technical aid and assistance to produce major naval units. For example, West Germany with West German technical assistance assisted Argentina in submarine construction. Argentina assembled two Type 209 submarines from prefabricated sections.¹⁰ Recent surface ship construction is limited to UK-design (Sheffield class) Type 42 guided missile destroyers produced with British technical and material aid. West Germany has also assisted Argentina in the production of MEKO 360 class guided missile frigates.¹¹ There appears to be no significant program of new construction.

Argentina's small aerospace industry is striving to become internationally competitive. Military aircraft have been the primary responsibility of Fabrica Militia de Aviones (FMA), one of two components of the Area de Material Cordoba, a division of the Argentine Air Force. Argentina has focused its industry's capability for developing and manufacturing simple, light aircraft. The industry has the capability to design and produce various aircraft, including small transports and general purpose utility aircraft. Light military (training) aircraft are coproduced domestically under license from foreign firms such as Cessna, Piper and Hughes. Argentina is second only to Brazil among South America's aircraft producers.

As in the case of ground equipment, Argentina established a viable and internationally competitive aerospace industry through tapping foreign technology and management assistance. West Germany has proven a principal participant in helping Argentina achieve new levels of technology, efficient production and exports. Argentina plans to produce a new ground attack jet

trainer (IA-63) with Dornier of West Germany. The IA-63 jet trainer is also expected to serve as a tactical support fighter. It will have two underwing hard points for carrying weapons. Argentina expects to build a prototype IA-63 in 1984 and to begin production in 1985.¹² It will be constructed mostly from Argentine components and possibly powered by U.S.-built Garrett engines.¹³ Argentina's goal is to produce an efficient, inexpensive aircraft that will be attractive for export. The IA-63 should have the performance of a "Hawk" or "Alpha Jet" but cost about half the price.¹⁴ A production run of over 200 is foreseen by the Argentine Air Force alone.¹⁵

Argentina is also pursuing indigenous aerospace developments, placing most of its effort in a new version of its own IA-58 Pucara light tactical support aircraft. FMA is currently producing the IA 58 Pucara at the rate of 18 per year.¹⁶ More than 50 have been completed for the Argentine Air Force. An additional five have been ordered by Uruguay, Argentina's first export customer. These latter aircraft will be powered by U.S.-built Garrett TFE 331-11 engines replacing French-built Astazous turbo propeller engines.¹⁷

The Instituto de Investigaciones Cientificos y Siecnicas de los Fuerzos Armados--CITEFA conducts indigenous research and development of weapons and other equipment required by the armed forces. While most weapons produced in-country are of foreign design acquired through licensing agreements, CITEFA is developing an indigenous missile production and space research capability. It has already developed an air-to-surface missile (ASM) and an antitank guided missile (ATGM). CITEFA has also designed artillery launched two stage rockets. These projects give Argentina valuable experience in missile design testing and manufacture.¹⁸

Regional Military Implications

The armed forces play a major part in the governments of all but three Latin American countries.¹⁹ The most frequent mechanism for political change in the region continues to be the military coup d'etat. With the military exercising such potent power in government, it should come as no surprise that these countries spend heavily on arms, more heavily than any outside military threat would seem to justify.²⁰ Many Latin American countries share disputed frontiers and border incidents occur frequently. An uneasy peace still exists between Argentina and Chile over the century-long dispute over the Beagle Channel.

Within recent years Argentina used military forces not only to support foreign policy goals (the Falklands), but also domestic policies. Military control of the steel industry, for example, has a direct effect on the civil sector. Military leaders determine steel priorities for military goods vis-a-vis civilian consumer products. The power of the military government is weakening, however, at the conclusion of the Falklands war an Argentine politician commented, "We are witnessing the end of another military regime, the sixth since the process began in 1930 and like all of the military regimes that promised a solution, it has wound up by seeking a way out."²¹ On March 1, 1983, Argentine President Reynaldo Bignone announced a plan to hold general elections on October 30, 1983. The general elections are to be followed by a transfer of power from the military to a civilian government in January 1984.²²

Brazil has been Argentina's traditional rival for political, economic and military influence in the subcontinent. The military implications for both

countries are far-reaching. Although Argentina is the eighth largest country in the world, Brazil is the fifth. Their joint populations total more than 150 million.²³ Both countries enjoy a considerable level of self-sufficiency in food and mineral production. Although Brazil lacks oil resources, Argentina enjoys almost total self-sufficiency. Regarding the production of military equipment, Argentina's 180,500-man armed forces and Brazil's 272,850 are largely self-sufficient and may be near completely so by the 1990s.²⁴ While both countries have military industries with growing military exports, each is nearing nuclear power status.²⁵

With Argentina and some of its neighbors suffering from internal instability and corresponding domestic problems, the potential for regional conflict between traditional rivals remains as high today as any time since the Chaco War (1932-1935). Preparing for such an event, Argentina recently acquired military supplies from Panama and Venezuela, Mirage jets from Peru and EMB III Bradorante tanks from Brazil.²⁶

Regional Economic Implications

Latin American arms production not only satisfies a desire to meet political and industrial objectives, it is an attempt by some countries like Argentina and Brazil to meet balance-of-payment commitments. In fact, Argentine leaders have viewed arms exports as more important than food because the country can always buy food with the proceeds from weapons sales.²⁷ In its desire to capture a larger portion of the regions arms market, Argentina benefits by having a large, skilled workforce and a relatively large domestic market. Argentina's economic capability, resources, skilled manpower base, and so forth, are all essential ingredients for a growing indigenous arms production industry.²⁸

Argentina's dismal economic performance probably is having a disruptive influence on its defense production capabilities in the near term. Suffering from a deep recession, Argentina's GNP slumped at an estimated rate of 6.1 percent in 1981, led by declines of 16 percent in industry. Unemployment became a serious problem in the country for the first time during the decade and was estimated to be about 6 percent at the end of 1981. At the same time, the inflation rate again rose above the 100 percent mark, and is currently reported to be running close to 140 percent--one of the highest rates in the world.²⁹ The peso was devalued against the U.S. dollar by 500 percent between January and August of last year.³⁰ At the same time the bankruptcy rate for financial institutions has climbed while the country's foreign reserve rate has been falling. Not only has unemployment risen (13 percent in February 1982 and 18.5 percent in September 1982), the nation continually must fight the problem of capital leaving the country.³¹

With the prestige of the military leadership diminishing as a result of the Falklands crisis and subsequent deteriorating economic conditions, Argentina must move through a period of recuperation and perhaps even restructuring.

Regional Political Implications

Arms production in the Third World is often fostered by a struggle for equity in world politics. The arms race in Latin America may be due more to issues of status and social justice (i.e., human dignity) than to considerations of security and defense.³² While Argentina remains at arms length in its relations with stronger industrialized countries, it is in constant competition with its neighbors for regional influence and leverage.

This struggle has led to increased armament and militarism. As a consequence, the incidence of regional wars may be inseparable from the struggle for equality and social prestige.

The pattern of strategic development in Latin America indicates that the primary threat to regional stability will be intra-state conflict, not internal insurgency. While Communist-led insurgencies will continue to be a significant part of the region's strategic future, they will be much less significant than the historical territorial conflicts and growth of national power.³³ To some extent Argentina's eagerness to develop its arms production industry in a reflex action as it watches--with interest and envy--the success of neighboring Brazil's arms production effort. As traditional rivals, the national interests of Argentina and Brazil almost dictate a spirit of competition.³⁴

Implications on the U.S.

Although Argentina's decision to produce its own arms stems from a conscious decision to reduce external dependence, it also represented a response to a cooling of relations with the United States, especially with the Carter Administration over civil rights issues. The Carter Administration likewise sought to limit the introduction of advanced weapons and technologies into South America. Paradoxically these policy actions actually hastened the acquisition of arms by Argentina and other Latin American countries. For example, after the Carter Administration refused Argentina permission to procure the Cadillac Gage U-150 "Commando" armored vehicle and the FMC M113A1 armored personnel carrier (APC) in 1977, the Argentine Army arranged to build in country the West German designed Thyssen-Henschel, 30-ton tanks (based on

the German "Marder" IFU armed with a 105mm gun and a 20mm cannon).³⁵ The United States cannot prevent Argentina from importing technology; there are too many sources throughout the world willing to sell technology to Argentina. Yet, Argentina cannot expect indigenous defense production to lead to a complete independence from international defense trade. Even the U.S. must rely on some imported technologies, raw materials and skills to achieve its defense posture.

Since the conclusion of military operations in the Falklands, the Argentine armed forces are binding their wounds and attempting to replace the tremendous amount of lost equipment. The Air Force faces the most pressing problem; it must make up for the 40 to 60 aircraft that were downed during the conflict.³⁶ Since it will take Argentina about four years to produce that many Pucara tactical support aircraft, the question is will Argentina buy replacement aircraft and, if so, from whom.

The 1982 "betrayal" by the United States in the Falklands War led to what some news people in Argentina called an anti-American "phobia".³⁷ Despite such bitterness, the war realigned Argentine foreign policy only to a very limited degree. While Argentine leaders repeatedly said that United States support for Britain might force them to turn for aid to the Soviet Union or Cuba, no such realignment has taken place. It is expected that Argentina will be forced to buy replacement aircraft from Western suppliers to supplement their own production. Argentina has been a traditional buyer of Western weaponry and expects that the current arms embargo will be lifted in the near future.³⁸

Brazil

In 1964, the military took control of the Brazilian government to ensure internal security and to resolve political and economic problems that had reached a crisis state. Brazilian military leaders realized that the country's large and relatively modern economic sectors required that they maintain effective relationships with civilian professionals and industrialists. All three groups recognized that industrialization constituted the key to the nation's economic stability as well as to supporting its regional and international ambitions. Despite some challenges and internal conflict, the military spread its control across the country.³⁹ "The fact that by 1968-1970, the economy had recovered from its stagnation and had one of the fastest growth rates in Latin America reinforced the military's confidence in their ability to guide the economy."⁴⁰

Between 1968 and 1974, Brazil's annual growth of real GNP averaged 10.1 percent. This prosperous period, known as the "Brazilian Miracle," came to an end in 1974 as Brazil and other countries suffered from massive OPEC oil price increases. The need to pay enormous amounts of oil imports led to significant balance-of-payments deficit and substantial foreign debt.⁴¹ Specifically, Brazil owes the world's second largest debt of \$80 billion.

Brazil has the largest and perhaps the most professional armed force in Latin America and historically has been a recipient of large arms orders. Increased exports are critical to success in an attempt by Brazil to draw down its accounts deficit. In this regard, economic ties to regional neighbors prove especially important. Since 1970, "the fastest consistent growth in

demand for Brazilian goods has occurred among Brazil's neighbors."⁴² As a regional source of arms and munitions, Brazil can assist other nations in limiting their dependency on the larger industrialized countries.

Brazil, with a relatively high literacy rate, natural wealth and transportation network, is more than self-sufficient in food and agricultural products. This strong agriculture has provided a solid foundation for manufacturing and industrial development.⁴³ Since 1964 the country's military leadership has seen itself as the catalyst for achieving security, progress, development, industrialization and fulfillment of Brazil's true potential as a world power. Accordingly, the military leadership has achieved consensus with industrial and agricultural leaders toward the goal of working for "Brazilian" greatness. The private sector, despite some conflicts with and fear of the military sees military strength as a necessary bulwark against guerrilla threats and exorbitant wage demands.⁴⁴ In order to encourage industrial growth, the government restricts imports, works to provide a healthy climate for exports and promotes local production of capital goods. Although the country insists on the locally produced content of foreign manufactured products, it also encourages Brazilian firms to purchase foreign technology in order to set-up new industry. The basic goal is self-sufficiency through local production of capital goods with a possible spin-off benefit being a surplus for export.⁴⁵

As in the case of Argentina, President Carter's policy toward Brazil had much to do with reinforcing that country's determination to seek defense production independence.⁴⁶

Defense Industry

During the ten-year period, 1967-1976, Brazil looked to the U.S. for most of its arms. U.S. refusal to sell some advanced items forced Brazil to look to European countries. In 1977, Brazil severed its arms relationship with the U.S. and turned aggressively to domestic production, importing technology from Europe under licensing and coproduction arrangements. Using a mixture of private and government collaboration, Brazil has orchestrated aggressive development of its own defense industry.

The most impressive evidence of Brazil's defense production capability lies in its aircraft industry. Today, Brazil ranks sixth among world producers of aircraft. The government-owned EMBRAER firm produces both civil and military aircraft. From manufacturing five aircraft in 1971, Brazil increased production to 554 aircraft in 1977. Its BANDEIRANTE aircraft and XINGU light transports constitute the chief production items. Under license from Italy, EMBRAER is producing the XAVANTE jet trainer/ground attack fighter. Brazil has joined with two Italian firms to produce a light attack fighter/bomber, AM-X. Aerotec and Neiva, two privately-owned aircraft companies, round-out the industry's fixed-wing capability. In 1978, Brazil and France formed Helibras, a company designed to produce jointly helicopters in Brazil, with an expected initial production of 230 helicopters.⁴⁷

ENGESA produces wheeled and tracked military vehicles, especially armored cars and personnel carriers. The company also produces an array of military trucks, a tank destroyer, a 90mm gun and turret and a tank.⁴⁸

Brazil maintains the largest shipbuilding industry in Latin America. The largest shipyard is a joint venture with the Japanese, the second largest with the Netherlands. ESABRAS, a government agency, coordinates the activities of the seven largest shipyards. Under license from Great Britain, Brazilian shipyards produced two modern Niteroi class destroyers. Brazil will also build four German-designed corvette patrol boats. The shipyards reportedly have numerous orders for new construction. Brazil's Navy has plans for a helicopter carrier, 18 landing craft, a tanker, three tugs and additional patrol craft. Brazil expects to begin building a submarine and the Navy Minister has speculated that the country could build a nuclear submarine in the mid-90s.⁴⁹

For years Brazil has produced explosives, small arms and ammunition. In 1975, the government of Brazil established a company called IMBEL to "absorb all existing arms companies, coordinate private production of war materials and oversee private and public investment in the arms industry."⁵⁰ Apparently the government attempted to organize and orchestrate the network of various arms suppliers and subsidiaries toward common industry goals in collaboration with the government.

AVIBRAS, Brazil's aerospace firm produces rockets, surface-to-surface, air-to-air and air-to-surface missiles, and was scheduled in 1982 to open the largest rocket factory of its type in the world. Although Brazil has purchased the French/German ROLAND air defense system, it is assembling associated missiles in Brazil under license. In addition, Brazil is producing the COBRA anti-tank missile under license from West Germany.⁵¹

In the electronics and communications field, Brazil has a number of firms producing military equipment, primarily radios and basic communications devices. For sophisticated equipment and expertise, Brazil imports foreign know-how. For example, under license from the French company, Thomson CSF, Brazil is constructing a French-designed air traffic control/air defense radar system to cover the entire country. In addition, Brazil is planning a communications satellite and earth station, using foreign technology and assistance.⁵² The Brazilian subsidiary of a British firm will act as prime contractor for the installation of fire control, information and surveillance electronics for the four corvettes being built by Brazil.⁵³ Some Brazilian firms are moving into higher technology areas and laying a foundation for growing sophistication.

In collaboration with France and West Germany, Brazil has three nuclear reactors for research and continues to develop its expertise in this arena. It is reported that Brazil is experimenting with delivery systems and could produce a nuclear weapon in the late 80s.⁵⁴

Brazil's ambitions in defense production are complemented by a large and growing research and development effort targeted on gaining the technology and expertise found in industrialized countries.

Exports/Imports

It is now clear that Brazil has embarked on a defense production course which takes the country well beyond force modernization and self-sufficiency. In particular, Brazil's growing military production capacity, increasing technology sophistication, expanding exportation of military equipment and

aggressive marketing efforts reflect its goal of becoming a competitive force in the world arms market. In its major marketing efforts, Brazil is targeting the Middle East, South East Asia and Africa. The rationale for these efforts is economic. Clearly, the expanding industry and production necessitate markets and promotion beyond Brazil's internal consumption. In particular, Brazil recognized the opportunity for a respected Third World leader to offer less-sophisticated, quality arms at less cost to other Third World countries.

In line with Brazil's import substitution rules, items can only be imported if there is no local substitute product. When it imports, Brazil has been very successful at gaining technology through licensing and subsequent Brazilian production. Local content rules (now 90 percent) help to reinforce Brazil's efficiency goals.⁵⁵ Nonetheless to fill the void in its own defense products and to ensure force modernization, Brazil continues to be a major importer. For example, Brazil imported nine LYNX helicopters, four NITEROI class destroyers, three OBERON class submarines and SEACAT anti-aircraft missiles from Great Britain; four MIRAGE aircraft and EXOCET surface-to-surface missiles from France; IKARA anti-submarine missiles from Australia and two coastal minesweepers from West Germany.⁵⁶ Most of these procurement actions date back to the late 1970s and it is likely Brazil will not repeat them as it closes the knowledge and expertise gap.

EMBRAER's BANDEIRANTE aircraft have proved to be a popular sales item; Guyana and Chile have bought some. France has ordered the XINGU light transport while Chile has taken delivery of Neiva's N622 Universal Trainer and Bolivia and Paraguay have contracted for Aerotec's UIRAPURA trainer. Many countries have expressed an interest in EMBRAER's new developments. EMBRAER

officials toured 14 countries in Europe and Africa to market their aircraft.⁵⁷ At the RIOMAR '79 International Maritime Exhibition, Brazil exhibited its naval and maritime expertise and reported the completion of seven ships and contracts for 29 additional ships from foreign investors. At the close of the exhibit, Brazil had gathered 17 additional contracts valued at \$450 million.⁵⁸

Brazil's line of armored vehicles (JARARACA, CASCAVEL and URUTU) has proved especially popular. Iraq reportedly purchased some 1,500 trucks and a number of armored vehicles; it has praised the performance of these vehicles in the Iraq-Iran War. Libya, Qatar, United Arab Republic, Guyana, Bolivia and Colombia have also purchased vehicles from Brazil's ENGESA.⁵⁹

Regional Military Implications

What is the military or security implication of this arms production buildup? At present Brazil confronts no threat. However, internal and external conflict have long plagued the countries of Latin America. All have encountered insurgencies or have witnessed them in neighboring countries. Border and territorial disputes continue today as potential trouble spots. Communist Cuba sits as a base, sponsor and supporter of insurgencies throughout Latin America and the Third World. Continuing problems in El Salvador, possible communism domination in Nicaragua, the Falkland Islands dispute, Soviet arms shipments to Peru and other disputes reflect a region in turmoil. Some observers suggest that Chile is the most likely trouble spot in all Latin America, being manaced simultaneously by both Argentina and Peru.⁶⁰ In contrast, some analysts cite Venezuela's territorial dispute with Colombia and

Guyana as the most sensitive and volatile situation. These current concerns together with an awareness of historical disputes, rivalries, and distrust, have given the Brazilians the mind-set that vigilance, preparedness and military strength offer the key to stability, power and prestige. Brazil seems intent on securing military dominance in the region and significant ranking as a world power. In light of the divisive problems that beset Argentina, Brazil now has the opportunity to surpass its traditional rival.

The size and capabilities of Brazil's armed forces in addition to the country's emergence as an exporter of quality defense products has given the Brazilians increased power and prestige. Brazil has used this power to become a stabilizing force, especially for the most part within Latin America. Brazil's 1980 defense accord with Argentina continues in force, strengthening its stabilizing role, yet, at the same time, Brazil has intervened in behalf of Guyana in an attempt to prevent Venezuela from pressing its territorial claims.⁶¹ It has signed a cooperation agreement with Guyana and has sold the Guyana's planes and armored vehicles. By this action Brazil is offering Guyana a profitable relationship with an anti-Communist country. Guyana has relations with Cuba but has adopted a policy of accepting assistance from any source. In addition to the economic benefits of exports, Brazil's sale of patrol boats, planes and armored vehicles to Chile also serves as an attempt to balance power in light of Chile's continuing problems with Argentina, Peru and Bolivia. The presence of a 300-man military mission in Iraq evidences a Brazilian influence beyond that of Latin America.⁶²

Regional Economic Implications

As with many other countries, Brazil suffered gross economic penalties because of the 1973 OPEC oil price increases. In late 1979, inflation reached almost 90 percent and in 1980 the current account deficit was \$13 billion. At present, Brazil's foreign debt totals \$80 billion.⁶³

Increased export sales of military equipment assists in reducing Brazil's deficit and should improve its financial standing. Because Brazil sells chiefly outside the region, its increased exports should not negatively affect the accounts of regional neighbors.

In light of its foreign debt, Brazil has had to review its import expenditures. Since the large expenditures associated with defense related items helps increase its own industrial base as well as future export and income potential, Brazil will apparently tolerate resulting financial exchange problems.

Regional Political Implications

Brazil is transitioning to a civilian government with the successful elections for the Senate, governorships and assemblies in 1982. Under present plans, transition will be completed in 1985 with the election of a new President by the Chamber of Deputies and the Senate. It appears that a continuation of present policies will be fostered during the transition through oversight by the current leadership and ever-present military.⁶⁴

The government of Brazil views defense production and arms exportation as a primary source of income and an important avenue of diplomacy.⁶⁵

Military Implications for the United States

A strong Brazil can assist in regional security and the security of the South Atlantic. It can also act as a regional power broker in terms of military force and influence. The success of the military government in fostering industrial and defense production has increased pride, professionalism and confidence of its military leader and earned them respect abroad.

To this end, Brazil has demonstrated its independence and intent to control its own destiny. The U.S. lost credibility, status and respect through the attitude of the previous administration. U.S. support for Great Britain during the Falkland Islands crisis did little to help the U.S. image in the region.

"Considering Latin America, what is new in the 1980s is the increased capability of governments to mobilize resources on short notice and commit a credible collection of assets to combat for sustained periods. . . . now that many regional powers have built credible force and decisionmaking structures, the only remaining requisite to full-scale conflict is will."66

The U.S. military should move quickly to reestablish a solid rapport with the Brazilian military through Joint Staff talks as a follow-up to this administration's revised policies and President Reagan's recent visit to Brazil.

Economic Implications for the United States

Brazil's increased foreign military sales and less dependence on importation should help that country reduce its deficit and foreign debt. The U.S. would benefit if Brazil proves successful in this undertaking. At the same

time Brazil's export promotion and drive for a share of the world market causes trade problems with the U.S. In this regard, Europe and the U.S. lost their market share as defense trade among Third World countries reached at least \$4 billion in 1980.⁶⁷ Recently, France turned down proposals to co-produce several U.S. aircraft and gave EMBRAER of Brazil its largest single aircraft order for \$50 million.⁶⁸

In another related development, the U.S. International Trade Commission rejected a request from Fairchild Industries to restrict civilian aircraft imports from Brazil. Fairchild claimed EMBRAER was unfairly subsidized by the Brazilian government.⁶⁹

Political Implications for the United States

The U.S. refusal to sell advanced arms to Brazil coupled with the Carter Administration's linking of military assistance and sales to human rights violation led Brazil to renounce further U.S. military assistance. Brazil turned to European suppliers and accelerated development of its own defense production capabilities. This, in turn, impacted upon U.S. technology transfer, U.S. military sales and relations. A confident Brazil has emerged in 1983 as an aggressive competitor in the world market of arms. In addition, Brazil has developed a competitive edge among Third World countries through its friendship, leadership and growing technological sophistication in the arms arena. "The country's success in defense technology stems from . . . size . . . economic capability . . . and a growing sense of pride in its independence from the North America with whom Brazil is having less and less in common."⁷⁰

The elimination of most U.S. Military Assistance Advisory Groups (MAAGs) and Military Groups (MILGPs) in foreign nations as directed by the 1977 Arms Export Control Act was seen as "a clear signal of a diminution in U.S. interest and a degradation of the historic and highly valued traditional military ties."⁷¹ U.S. support of Great Britain during the Falkland Islands' crisis further eroded support for the U.S.

Brazil will never be totally independent from outside sources to meet some of its needs. It remains for the U.S. to salvage as much of the relationship as it possible and to strengthen our ties and friendship through coordination, collaboration and assistance where we have mutual interests. As cited by the U.S. Under Secretary of State for Security Assistance: "the alliances and cooperative arrangements we need to forge cannot be coerced. They require of us a new maturity in our relationships with other nations, one that recognizes the sovereignty and dignity of other societies as well as the enormous diversity of cultures that exists among them."⁷²

CHAPTER III

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CHAPTER IV

EAST ASIA: THE REPUBLIC OF KOREA AND NATIONALIST REPUBLIC OF CHINA (TAIWAN)

The Republic of Korea

Over the last decade the Republic of Korea (ROK) or (South Korea) has developed a substantial capability to produce military items. The ROK armed forces use most of these items but increasingly Korea is exporting military products around the globe. This growth in ROK defense industries presents opportunity and poses problems to the the United States.

South Korea is a densely populated country, with about forty million people living in an area which is roughly the same size as the state of Virginia. After the Korean War the ROK was in shambles. With most of its farms and factories destroyed, and few natural resources to fall back on, the prospects for rapid economic growth in the early 1950s appeared very bleak. Many developing countries would like, however, to emulate South Korea's leap from poverty in the 1950s to the relative prosperity that it enjoys today. Its economic growth has been nothing short of spectacular. National income has quadrupled in real terms, while per capita income has risen some 230 percent.¹ This income has been relatively well distributed, and most people in the country have shared in this rising prosperity.

Numerous factors account for Korea's economic miracle: peace, large amounts of U.S. aid, the work ethic, relatively high educational level of

the people, and probably most important, the far sighted economic policies of President Park Chung Hee, who served as the head of a very authoritarian regime from 1961 to 1979. Since the early 1960s the government has guided the destiny of Korea's business, and it continues to do so under the current Head of State-President Chun Doo Hwan. The South Korean have evolved an economic system based on a pragmatic mixture of market and non-market forces. When the market works, they follow laissez-faire practices, when it doesn't, government officials show no hesitation in intervening by means that range from friendly phone calls to public ownership.

For the past twenty odd years the government's strategy for rapid economic growth has been based on heavy industry exports. These heavy industries include shipbuilding (in 1980 South Korea ranked second in the world in shipbuilding orders),² steel, motor vehicles, and petrochemicals. Today South Korea's industrial sector is suffering the same recessionary pressures as the rest of the industrialized world. GNP growth has slowed to about 6 percent, and exports have declined significantly except for ship and machinery exports.³ The slowdown largely resulted from weak purchasing power in the U.S., Japan and Western Europe. In response to this economic slowdown, the government, in its latest five-year plan, 1982-1986, has decided to invest more in light industries and in social projects such as housing, power plants and subway construction. The plan also calls for significant additional investments in textiles, electronics, shipyards, and oil refining/storage facilities, some 19 major projects in all. Most of these projects are intended to spur exports, which the government predicts will expand from \$20.5

billion in 1982 to some \$53 billion by 1986.⁴ Although a sustained economic recovery probably won't begin until export markets revive, Korea seems to be well positioned to take advantage of the end of the worldwide recession. The relative health of its heavy industries should permit South Korea to continue its drive to become a significant industrial power in the free world.

For about 15 years following the end of the Korean War in 1953, South Korea concentrated on rehabilitating and reconstructing its economy, receiving active assistance from the United States. During this period the South Koreans depended on the United States for most of their weapons and other military material. Since that time, however, it has joined the ranks of the world's middle-level manufacturers and exporters of military items. In spite of this progress, South Korea remains one of the leading arms importing countries in the world. The United States sells most of these arms to South Korea and also provides much of the technology used by Korean defense industry in its domestic production efforts.

It appears that the South Korean government first decided to develop its own defense industry in the late 60s. No doubt, numerous domestic considerations led to this decision, but American policy, specifically the NIXON DOCTRINE, also proved highly influential. The 1969 NIXON DOCTRINE, stipulated that if a conventional war broke out on the peninsula, the South Koreans would assume primary responsibility for their own defense. U.S. withdrawal from the war in Vietnam and the eventual North Vietnamese victory had a very sobering effect on South Korea. The South Koreans saw a need to bolster their own defense capability. Certain U.S. actions contributed to the

Korean decision to reduce reliance on U.S. arms, including a 1975 decision to suspend the military aid program, a reduction of Foreign Military Sales credit and a refusal to sell M60A3 tanks, LANCE surface-to-surface missiles, and F-16 fighters to the ROK armed forces.⁵ Over the years, the United States suspended production of numerous military items that it previously had supplied to ROK forces.⁶ This cut-off created severe logistic problems for the Koreans. The Koreans decided that they could cope with these problems best by establishing local maintenance facilities, producing necessary spare/repair parts, and in some cases manufacturing complete items of equipment. In this way, domestic production helped the Koreans prolong the life of U.S. made equipment and modernize their forces.

Three basic domestic reasons account for the South Korean decision to create an indigenous defense industry. First, they desire the military capability to defend their country against possible North Korean aggression. Second, they can use their defense production to improve the economic well being of the nation as well as the standard of living. Third, Korea has a desire to gain greater political independence, thereby to a degree, lessening the ability of the United States to exert diplomatic pressure on South Korea.

The military reason is by far the most compelling. The South Koreans do need a strong defense capability to maintain their national security because the threat from the north is serious. Their avowed enemies, the North Koreans, have conducted a massive and a sustained military build-up for over two decades. North Korea has invested more money, per capita, on military items than any other country in the world, except Israel. As a result of this

build-up, it now enjoys a force ratio of about 5 to 1 over the South Koreans,⁷ a ratio that most Communist military doctrine stipulates as the threshold for a successful offensive action. North Korea surpasses South Korea in terms of ground combat forces, fire power and armored mobility. It also enjoys an edge in naval and air force arsenals. Most important, North Korean military forces are offensive-oriented while South Korea chiefly structures and trains its forces to conduct defensive operations. North Korea has attacked the South before, and apparently has the military posture to do so again.⁸ It also has the capability to launch a wide range of limited armed provocations in the South. Since the armistice, North Korea has committed as many as 2,600 violations of the truce terms.⁹ The secret construction of three infiltration tunnels under the demilitarized zone by the North Koreans in the 1970's are good examples of these violations.

North Korea's leader Kim-Il-Sung has declared "if and when a war breaks out in Korea, North Korea will only have the military demarcation line to lose and unification of the fatherland to gain."¹⁰ Such threats drive the South Korean defense industry.

Defense Industry Production

The South Koreans believe that a capability to build their own arms is essential to maintaining a realistic deterrent. The South Koreans also feel that their defense factories could provide a rapid and dependable, mobilization capability. They have placed most of the defense plants well below the DMZ, making them less vulnerable to North Korean attack. These

factories should be able to provide a continuous flow of military items, specifically designed to meet unique ROK combat requirements.

In addition to military considerations, Korea has obvious commercial or economic reasons for domestic arms production. Defense industries create new jobs, transfer technology to the civilian economy, acquire new technical managerial skills, reduce balance of payments, avoid a "brain drain," and enhance overall industrial growth.

Likewise a local defense industry gives South Koreans some political benefits. The Koreans believe that in order to conduct a more independent foreign policy they must increase self-sufficiency in arms production. They cannot rely totally on the U.S., and hope to have a great deal of freedom of political action. With political independence comes enhanced prestige and influence not only in East Asia, but throughout the Third World.

Once the South Korean government decided to develop its defense industries, it developed a plan that took advantage of its strong petrochemical, iron and steel, and machine industries. These industries formed the basis upon which the South Koreans built their defense sector because their production methods were similar to those needed in defense industries. The plan also addressed potential problems related to the scale of investment, to business risk, to importation of technology, to the need for raw materials, and to quality control.¹¹ To support the infant industries, the South Korean government adopted policies emphasizing long term, low interest loans, tax favors, profit guarantees, and draft exemption for key employees. However, it did not allow any Korean company to have more than 30

percent of its capital investment devoted to defense products.¹² This policy was designed to provide a broad base of support for the industry, while minimizing the financial risk.

The government also established an R&D organization with the mission to provide technical assistance to defense contractors. Korean R&D managers very carefully selected ten basic items from among the U.S.-made weapons and equipment of the ROK forces. They then fabricated copies of these ten items on a trial basis. The government likewise chose its contractors from among companies best known for their technical capabilities and business achievements. These contractors conducted very successful trial production. Positive results in tests of these weapons gave the South Koreans a sense of confidence that they could make their ambitions a reality. Following these initial efforts South Korea also produced several artillery weapons also on a trial basis, again with results heartening to the Koreans.

Based on these two successful programs, the South Koreans next conducted research on production techniques for most of the conventional weapon systems and other military items used by ROK forces. Armed with this knowledge, in the first half of the 1970s they began producing relatively simple items and later moved on to more complex systems.

ROK defense industries largely have produced copies of conventional U.S. weapons and equipment, but over the past ten years they have made efforts to modify some U.S. items making them more responsive to South Korean needs. They also have produced a few new items, based on South Korean or European

technology. These new modified products are called "K-type" items. Although early production efforts experienced a great deal of trial and error by almost any measure, South Korean attempts to create a strong and modern indigenous defense industry have proven successful. The reasons behind this remarkable achievement include effective government direction and assistance, favorable U.S. technological support, efficient R&D efforts, and competent, in-place, related industries.

Today, some 80 to 90 South Korean defense contractors produce a wide range of products that currently satisfy an estimated 70 percent of the nation's requirements for military hardware,¹³ from uniforms, parachutes and rifles to sophisticated, complex systems such as tanks, helicopters, jet aircraft and frigates. The technology of these items varies from World War II varieties to that used in the Falkland Islands' campaign. Most of the new technology still comes from the United States. Slowly but surely, however, the South Koreans are diversifying their sources, and improving their own in-house capabilities to do original R&D work. They probably now rank with nations such as Singapore, South Africa, and Brazil in their ability to design and produce arms. In the next ten years, they could easily catch up to small European arms-makers such as Sweden.

In the future the South Korean defense will face several production challenges. To counter the North Korean threat, ROK forces must be modernized and provided with increased capabilities to fight a protracted war. The Force Improvement Plan for 1982 to 1986 emphasizes the procurement of modern artillery, anti-tank weapons and armored fighting vehicles. It also calls for

larger stocks of munitions and other war reserve material to meet the anticipated intense demands of modern combat. This requirement is particularly important because the North Koreans can support 90 days of combat without resupply.¹⁴ South Korean defense industries will have to meet the bulk of these future defensive needs. Their emphasis must be on supplying the ROK ground forces, since in any future war on the Korean peninsula ground combat will prove decisive. The South Koreans will, on the other hand, continue to depend on the U.S. for advanced, specialized naval vessels and aircraft. If South Korean arms producers succeed in providing the bulk of the needed arsenal then they must stay competitive with other arms merchants, and they must continue to show business profits. Although profits have sharply declined recently, and well over 50 percent of their production capability is not being used currently because of the world recession, the prospects for long term growth within most of the ROK defense industry appear favorable. Their factories produce high quality goods, and charge relatively low prices. Thus, as the recession ends and more money becomes available, demand for South Korean military products should increase accordingly. In the meantime, President Chun will attempt to weather this economic storm by encouraging consolidation in Korea's defense industries to reduce over capacity.¹⁵ The government will also probably grant additional tax credits and provide liberal credit and loan repayment schedules. In general, it will do whatever is necessary to keep this vital industry healthy. President Chun sees arms exports as one of the best solutions to the recession in his country.

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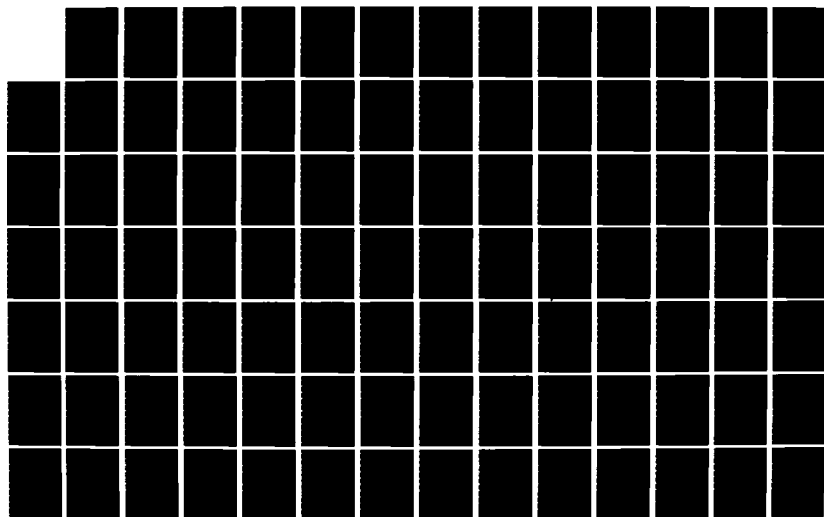
GROWING DEFENSE PRODUCTION IN NEWLY INDUSTRIALIZING
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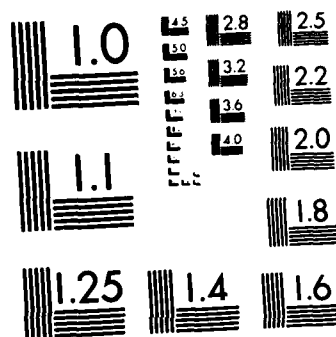
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NATIONAL BUREAU OF STANDARDS-1963-A

Defense Industry Exports

From 1968 through the end of 1976 the South Koreans directed their defense industry almost exclusively toward meeting domestic requirements, and did not aggressively push exports.¹⁶ In fact, during this nine year period the value of all their arms exports amounted to only about ten million dollars.¹⁷ What few products they did sell abroad consisted mainly of non-weapon or quartermaster type items such as gas masks, communications equipment, uniforms and tents. As the defense industry grew and opportunities to sell their military products abroad increased, the pressures to modify their export policies intensified. In the mid 1970s the government decided to move cautiously into the arms exporting business. Their export plan resembled the scheme they previously fashioned to develop domestic arms production. They started by exporting non-lethal items first, then move on to unsophisticated small arms and ammunition, and finally they sold more complex weapons.¹⁸

Economic motivations dominated the decision to expand exports but political considerations played a part as well. The South Koreans obviously saw the financial benefits of exporting arms abroad. After all, exports had fueled their remarkable economic growth in the 1960s and early 1970s. A resource deficient South Korea simply needed exports to survive economically and its the defense industry faced the same fate. Military sales to other nations promised to help the South Korean economy in a number of ways. They would assist in recovering some of the tremendous amounts of money that the defense industries spent on R&D and capital investments, money that could not

be recouped from domestic sales alone. They would reduce the cost of supplying ROK forces because increased levels of production would result in economies of scale. Arms sales abroad also promised to soak up excess production capacity, provide needed foreign exchange, and reduce balance-of-payment problems. In the political arena, foreign military sales held the promise of increased influence and prestige abroad. It could also help to offset North Korean gains in the Third World.

Once the government decided to sell arms abroad, in typical South Korean fashion, it worked hand in glove with the civilian defense contractors to make the export campaign a success. Perhaps the best example of this cooperative effort came in the fall of 1981. As part of an annual Armed Forces Day celebration, the government arranged for some 92 local producers of arms and other defense related equipment (the Korea Defense Industries Association or KDIA) to exhibit their products and services from 25 September to 4 October 1981, at the modern Korean Exhibition Center in Soeul.¹⁹ Labeled KODEX-81, the exhibition provided a great opportunity for the privately-owned defense industry to show off the range and quality of its wares to prospective buyers from abroad, especially to those from the Third World countries. This exhibition, the first put on by the South Koreans, proved a success. It attracted over 85,000 visitors from some 63 countries.²⁰ Items on display ranged from barbed wire, uniforms, and communications gear, to bombs, Howitzers, missiles, tanks, naval vessels and helicopters. KDIA officials reported that Korean companies signed purchasing contracts worth more than \$100 million.²¹ Another South Korean defense exposition, on a scale equal

to or larger than KODEX-81, is scheduled for 1984. In addition South Korean salesmen, up to and including President Chun, have gone on the road seeking new markets. As an example, during President Chun's two week swing through Association of Southeast Asian Nations (ASEAN) countries in June of 1981, he placed the sale of defense equipment high on his priority list. The results of these efforts have met with reasonably good success. The value of announced sales jumped from about \$5 million in 1977 to roughly \$250 million in 1981.²² Since the South Korean government hesitates to publish data on arms sales, these sales figures most likely understate the actual case. It seems very reasonable to assume, however, that if the South Koreans are making a particular defense product, they have either sold some of these items already, or they are pushing vigorously to do so in the future. In their original export plan the South Koreans decided to aim their advertising campaign at the Third World and, not surprisingly, that is where most of their exporting success has been achieved. Many developing nations in East Asia, the Middle East, Latin America and Africa have purchased South Korean defense wares. Based on significant purchases of naval vessels, Indonesia would appear to be their "best" customer. The U.S. has purchased some South Korean military products.

In their drive to become a leading exporter of arms in the free world, the South Koreans face numerous difficulties and challenges. Probably the biggest obstacle results from a U.S. desire that South Korean arms sales do not expand too much. The U.S. has in the past, supported the development of sufficient arms production capability in South Korea to enhance its self-sufficiency,

but selling arms abroad poses a different problem. Foreign sales raise unpleasant issues like arms control, competition with American arms dealers, and high U.S. unemployment rates. Most South Korean arms exports must be approved by the U.S. government, because Korea produces a large percentage of these items under license from American defense contractors. It is significant to note that most of the \$250 million worth of defense equipment that South Korea reportedly sold abroad in 1981 consisted of items that were not subject to U.S. controls. Many South Korean officials believe that if the United States lifted these controls arms sales would rapidly expand to more than \$2 billion annually.²³ Repeated efforts by the ROK government have failed to convince the United States to relax these controls. Quite the contrary, the United States has consistently insisted that it must retain strict control over foreign sales of arms made in South Korea under license from American contractors. Secretary of Defense Casper W. Weinberger said in Seoul on 31 March 1981 that, each request for export approval would be looked at on a "case by case basis, with an increased awareness of the importance of these sales to Korea." This policy has hurt Korean exports badly. Between April 1980 and March 1981, of some \$55.4 million in potential arms sales that the South Koreans submitted to the U.S. government for consideration, the United States approved only \$1.7 million.²⁴

U.S. reluctance to permit more sales, coupled with South Korean attempts to ignore or circumvent strict American controls have increased tensions between Washington and Seoul. This poses a major problem for two countries that rely on each other as much as the U.S. and South Korea do. South Korean

efforts to get around U.S. restrictions include modifying U.S. made items in a very cosmetic fashion, and then claim that such products are "home made," and no longer subject to the controls of the licensing agreement. Many of the "K-type" systems mentioned earlier appear to fall in this category. Another tactic has been to simply ignore the regulations, as the South Koreans did in the sale of patrol boats to Indonesia, and simply hope that the U.S. government looks the other way.²⁵ Third party sales also pose potential problems, especially when the United States will not approve sales to a particular country. To get around U.S. prohibition, the South Koreans could request shipment to an "acceptable" nation that could, in turn, forward the Korean arms to the "unacceptable country."

Increasing levels of competition from other arms producers in the Third World will also tend to restrict South Korean exports. Many of these nations enjoy some of the same advantages as Korea, and they will be vying for the same markets.

Overall, the prognosis for South Korean arms exports seem good. Although conventional arms sales around the globe might level off in the years ahead as the "new" nations satisfy their defensive needs. Third World countries should capture a larger share of the world's arms market. The nations of the Third World will continue to purchase more arms than any other group. In 1978 developing states accounted for 81 percent of the total on arms imported around the globe, and it is likely this percentage will not change drastically in years ahead.²⁶ Because they want relatively unsophisticated arms, with few, if any, political strings attached, these developing nations are

gradually turning away from the great powers and they are purchasing more defense material from other Third World countries. South Korea, because of its competitive advantages, should more than hold its own in the competition.

Unless a dramatic shift takes place in U.S. policy regarding the sale of Korean products built under license control, and this development is not likely, then South Korea will continue to move away from its reliance on U.S. technology. It increasingly will rely on its own R&D as well as on other non-U.S. suppliers. This shift should, however, be very gradual because the economic, military and political ties that bind the two countries remain very strong. Furthermore, although South Korean dependence on U.S. technology restricts Korean arms sales, in practical terms, Korean national security interests demand such continued reliance.

Regional Implications

The most significant military implications of the growing capabilities of the ROK defense industry relate to a potential war on the Korean peninsula. For the foreseeable future, South Korean arms production should have the effect of reducing the risk of such war. For their part the North Koreans, seem bent on a massive and sustained military buildup, regardless of what the South Koreans do. By bolstering a domestic arms industry the South Koreans strengthen their military capabilities, thereby favorably affecting the military balance. A more even balance should help reduce the North's chances of success in a war, and thus lessen the temptation of the North Koreans to initiate hostilities. Because only an outright North Korean invasion could

start a new war, an expanding South Korean defense industry in fact helps reduce the overall risk of war. It will do this although indigenous ROK arms production will raise the tempo of the arms race between the two countries. Arms races, however, do not necessarily lead to wars. Significant political differences, coupled with large disparities in military capabilities, do. The emerging ROK defense industry should help to keep the military balance on the peninsula from shifting too far in the North Koreans favor.

The North Koreans might be tempted to make a preemptive strike against the defense plants in the South. However, it does not seem likely, however, that the North Koreans would resort to such a drastic step, unless they are ready to prosecute a full scale war.

If the North Koreans do launch another assault on the South, the ROK defense industry could influence the nature of the war. It very likely would raise the conflict's level of intensity because the South would be able to field a larger and better equipped force than would have been possible otherwise. Likewise, this indigenous capability would give ROK forces greater staying power, thus increasing the probable duration of the war. Finally, the defense industry could have a positive impact on the outcome of any war. It could significantly improve South Korea's chances of victory by giving it the opportunity to bring this industrial capability to bear in the struggle. On the other hand, ROK exports most likely will have no similar effect in other parts of the Far East. Although their role might grow in importance, but it is doubtful that they would prove decisive in any wars.

The ROK defense industry, will chiefly affect South Korea itself. Defense production now accounts for a relatively small percentage of the nation's

gross national product. Yet, as the industry continues to grow at a moderate pace and arms exports rise, its significance to the South Korean economy will increase.

The ROK government incurred economic opportunity costs in order to develop the arms industry. It had fewer resources for investment in light industries and in consumer oriented public projects. These sacrifices should continue, but the benefits derived from the growth of the defense industry should more than offset them. Defense production is a relative "Johnny come lately" compared to other heavy industries that have produced a dramatic increase in the standard of living for most South Koreans. The arms industry has, however, already made a contribution to this progress, and will continue to do so in the future. As the South Koreans design, and produce more sophisticated defense systems, they will reap additional economic benefits from an industry that demands technically proficient blue collar workers, and well educated, highly competent managers.

ROK advances in defense production will also affect Far Eastern countries that produce similar military and civilian items, and are trying to make significant inroads in the same Third World markets. In the years ahead, Japan, the Republic of China and Singapore will all feel the pinch of South Korean competition.

Implications for the U.S.

South Korean defense production capabilities, as well as their export policies and activities definitely continue to concern the United States.

what the South Koreans produce, and to whom they sell their products, can have serious implications for U.S. national interests, as well as those of our other friends and allies throughout the world. However, a growing ROK defense industry probably holds more promise for the United States than it poses dangers. In military terms, domestic South Korean arms production offers many advantages. First, it tends to reduce the level of military support that the United States must provide to the ROK in peacetime. This country encouraged the development of their arms industry for this very reason. Increased self-sufficiency means that the United States will have to provide fewer grants in aid, and overly generous credit terms to the South Koreans. Equally important, the United States can then keep more military items within its borders building up war reserve stocks. In addition, it means that a smaller number of American servicemen have to man Korean trenches along the DMZ to preserve the peace. Furthermore if war does come, the level of American involvement could very well prove lower if the South Koreans have effective arms production base.

While South Korean arms production helps to reduce the risk of war in Korea, it indirectly could help the U.S. in the event of Soviet aggression elsewhere. (Its defense value now is very slight and will remain so for quite some time). As a time tested and proven friend of the U.S., the ROK in all likelihood would come to the aid of the U.S. This assistance could come in many forms, and it could be significant. The South Koreans, for example, could join with the Japanese, to help us first contain, and then destroy, the Soviet Pacific fleet. A steady stream of defense products from their own factories could provide South Korean forces with many of the capabilities

needed to take on such mission. If the United States could keep the lines of communication open, then South Korean arms could conceivably help equip and sustain American forces. In other words, the United States could tap South Korean industrial resources in its mobilization efforts.

Of course an increasingly self-sufficient South Korean defense industry also exhibits negative features. First, it tends to reduce the ability of the United States to influence ROK decisions on such military matters as base, training and overflight rights, on strategy, tactics and doctrine to be used by U.S./ROK forces in the defense of Korea, and on the interoperability of U.S./ROK equipment and supplies.

Although the growing capability of ROK industries to produce and export arms at competitive prices should have a small impact on the U.S. economy, it could cost some Americans their jobs. U.S. defense acquisitions will cost somewhat more as a result of falling economies of scale, and the U.S. balance of trade problems should worsen marginally because of declining foreign military sales to South Korea and to countries purchasing Korean defense products. Over the next ten years the South Koreans will increase their share of the world market for low to intermediate technology military products. Some of these gains will be made at the expense of similar U.S. exports. Greater production efficiency and lower wages will give the South Koreans a competitive edge. The United States undoubtedly will maintain an insurmountable competitive advantage over the ROK in marketing modern, complex, state-of-the-art military items. The South Koreans will also continue to rely on U.S. for both advanced and intermediate level technology, as well as on American raw materials and components. As long as the United

States proves willing, the South Koreans will continue to use existing licensing and co-production arrangements. Should the United States refuse such arrangements, the South Koreans no doubt will turn to other sources, such as the Western Europe or Japan. As a last resort, they could attempt to develop and produce these systems on their own. All in all, a growing ROK defense industry is likely to be a mixed political blessing.

Greater self reliance in arms production makes it more difficult for Washington to impose diplomatic leverage on the South Koreans. Their government won't have to count as much on U.S. political support, and consequently, they will be able to pursue a little more independent foreign policy than they have in the past. The ROK government increasingly could fail to back U.S. policies and actions in the international arena. The United States also might lose some control over South Korean arms sales abroad. Consequently more ROK weapons might fall in the hands of those countries/groups that are on U.S. arms "blacklists." South Korean military products might flow to more countries that are politically unstable, have aggressive, expansionist tendencies, or who pursue policies that are at odds with U.S. national interest. The probability that ROK arms will end up in the arsenals of various political terrorist groups likewise increases.

As South Korea becomes less dependent on U.S. arms, it might exert unwelcome military pressure outside the Korean peninsula, or take aggressive military initiatives against North Korea. The South Koreans might find it easier to ignore American requests for greater political freedom and fewer human rights violations under conditions of greater military self-sufficiency. Yet, given the fact that South Korea will continue to depend

heavily on the United States both politically and militarily, the United States can expect only a relative minor loss in influence over the next decade.

Finally, it seems reasonable to assume that when South Korean exports are used in various Third World nations in lieu of American or Soviet weapons, then both U.S. and Russian influence in these countries will decline accordingly. Here again, Korean arms exports can produce only a marginal effect.

Republic of China (Taiwan)

As an arms producer in the industrializing world, Taiwan fits between countries like Brazil, South Africa, and India and nations like Saudi Arabia, Pakistan, and Singapore.²⁷ The country produces between 65 to 70 percent of its needs for less advanced and smaller military items. It still must import a large portion of its anti-armor weapons, air defense weapons, artillery, armor, aircraft and large ships.²⁸ Thus, although Taiwan manufactures a significant share of its military gear, it clearly does not rank in the same league as Brazil, Israel, and India. On the other hand, Taiwan does co-assemble F-5 aircraft and some helicopters. Moreover, its rapidly expanding technological base may give it resources for future arms production far superior to countries such as Saudi Arabia and Pakistan.

Taiwan is an anomaly. It has diplomatic relations with less than 30 states. Its massive neighbor across the Formosa strait claims it as a province. Its strongest economic and political backer, the United States, changed course in 1978 by withdrawing recognition and establishing full

relations with the People's Republic of China. With about 18 million people versus a billion or so across the straits, Taiwan would appear to be on a descending curve. Yet, just the opposite may be true.

Economically, Taiwan is one of the Third World "miracles." From 1953-1962, its growth averaged 7.5 percent yearly. From 1962-1972, growth increased to 10.8 percent yearly, and from 1973-1980, despite two oil shocks and the end of formal relations with the U.S., growth still maintained an 8.7 percent yearly rate. In the three aforementioned periods, export growth was 19.5 percent, 29.9 percent, and 25 percent per year while yearly average industrial production rose by 11.7 percent, 18.6 percent, and 11.9 percent respectively.²⁹

This powerful, continuous economic development, in the face of a virtual pariah status on the world diplomatic stage, belies any notion that Taiwan's leaders and people plan any early merger with the PRC. This determined cast of mind and demonstrated economic potency underly the impulses motivating defense planners on Taiwan today.

Defense Industries

The very existence of Taiwan as an independent entity is constantly in question, requiring a level of defense planning and expenditure matched by few other countries of its size. As one observer noted, "local industry (on Taiwan) is an integral part of defense planning as it is in the Republic of South Africa."³⁰ Taiwan, for example, has the fourth largest standing military force in terms of the ratio of manpower to age 18-45 population, exceeded only by North Korea, Israel and Syria.³¹

Secondly, and important in this discussion, Taiwan recognizes that it may increasingly have to depend on its own efforts to produce the military equipment it feels is essential for survival. As one analyst noted after the U.S. cut its diplomatic ties: "Very few countries face [the type of] catalyst which forces a review of the entire industry and planning to involve domestic industry in overall strategic objectives."³²

Taiwan seems to have geared its defense industry to a realistic appraisal of the military challenge posed by the PRC. It clearly saw air power as a major strategic factor. Neither the Communists nor the Nationalists have enough naval power to undertake a major amphibious or airborne assault on the other without huge losses.³³ Indeed, to date Taiwan has selected as the centerpiece of its defense effort the co-assembly of Northrop, F-5 fighter planes.

Nor is this realism a recent development. As early as 1971, when the PRC was admitted to the UN and Taiwan removed, Taiwan came to doubt the depth of the U.S. commitment. Consequently it launched an ambitious military procurement program, aimed ultimately at nothing less than military independence from the U.S. and eventual self-sufficiency.³⁴ The Taiwanese among other steps, have initiated:

- Plans by the Taiwan Navy, from 1976, to develop in-country production of systems ranging from surface-to-surface missiles to naval vessels.
- The development of mines, anti-submarine warfare capability and frigate construction.

--The design of patrol boats produced locally.³⁵

--Allocation of \$150 million for research and development to produce its own advanced fighter aircraft engines with the goal of manufacturing high technology fighters in ten years. The Taiwan government has estimated it will cost \$1 billion to import high technology for use in an advanced fighter.³⁶

This advanced fighter, if it ever materializes, would be the third aircraft developed by Taiwan's Aero Industry Development Center based on original Taiwanese designs. Taiwan believes it to be critical to maintain a "qualitative edge" in its fighter aircraft over the numerically far superior PRC Air Force.³⁷

For many years, Taiwan's foremost military product has been the F-5 fighter plane co-produced with Northrop. In 1982, after many months of tense wrangling both within the United States Government and between the United States and the PRC, the United States rejected Taiwan's request for a more advanced version of the F-5. On the other hand, it extended the co-production agreement on the present version for a further 2 1/2 years. To the United States this action accorded with the policy enunciated in the U.S.-PRC communique of 1982 pledging the U.S. not to seek to carry out a long term policy of arms sales to Taiwan, but to reduce gradually its sales of arms to Taiwan.³⁸

Taiwan can expect no increase in assistance from the U.S. Yet, the cost of its own defense effort is significant. For 1982, Taiwan allocated \$3.34 billion to defense --equal to 39.8 percent of its budget and 8.3 percent of GNP.³⁹

Taiwan has not, however, emerged as an important arms exporter. "Taiwan (and others) are vigorously pursuing self-sufficiency in arms although Taiwan (and others) remain particularly dependent on outside sources of supply as well as production licenses."⁴⁰

Economic Implications

Two interrelated issues must be considered as we look at the future:

(a) Will Taiwan's increasing emphasis on military self-sufficiency lead it to seek export markets as a way of supporting its defense production base?

(b) Will its thrust towards becoming a "high tech" economy lead it to military applications with export potential?

Consider the country's economic history. After World War II, and the Chinese Civil War, agriculture was initially the economic mainstay. In 1952, 82 percent of the country's exports were either raw or processed agricultural products. By 1978, manufacturing accounted for 89 percent of exports.⁴¹ In terms of overall GNP, agriculture in 1981 accounted for 10 percent while manufacturing was 45 percent. It was estimated that by 1980, 38 percent of Taiwan's exports were heavy industrial goods. Taiwan in 1981 was the fifth largest source of machine tools imported into the U.S. In the 1970s, the government of Taiwan spent \$6 billion on major infrastructure and industrial projects. These included a steel mill, a shipyard and the third largest petrochemical industry in East Asia (after Japan and the PRC). Taiwan doubled its generation of electricity between 1975-80. The government is heavily

involved in these efforts. In 1973-9, the public sector was responsible for 51 percent of Taiwan's fixed capital formation. Over 30 percent of the chemical industry is state owned. The steel industry is state owned. Electronics is the next target area. Revenues tripled from 1976 reaching \$4.2 billion in 1980. Exports totalled \$3 billion and this industry overtook textiles as the country's biggest employer. Some 95 percent of the revenue in electronics was from consumer products.⁴²

Taiwan now exports more than half its \$45 billion GNP.⁴³ The country turns out 50 percent more engineers per capita than does the United States and is beginning a government backed push into semiconductors.⁴⁴ Recent news reports indicate that a 5,200 acre industrial park--dedicated primarily to semiconductors and computers--is well underway at Sinchu. Twenty-two companies are said to be already in operation. Companies get a five-year tax holiday, and the government will supply up to 49 percent of venture capital and loans at below market interest rates.⁴⁵

The issue is what, if anything, can Taiwan do with the industrial base besides the export of consumer goods. As previously indicated, it plans to develop a high technology fighter aircraft in the next ten years. Taiwan already co-produces F5-E nose sections which it ships to Northrop for the F-5 production program in California. Some 60 percent of the F5-E harness wiring is manufactured in Taiwan because the nose section of the aircraft has the largest number of electrical circuits.⁴⁶

In addition, Taiwan reportedly may try to market its own patrol boat fitted with a locally produced version of the Israeli Gabriel 2 surface-to-surface missile built under license.⁴⁷ The government also has announced

plans to manufacture a laser rangefinder, importing the needed laser rods from the United States or South Africa,⁴⁸ as well as adding \$288 million for fourteen undisclosed projects.⁴⁹

Such announcements generally note that these actions support the effort toward defense independence and the PRC's continuous pressure against Taiwan's normal arms suppliers. Such statements reflect Taiwan's concern about PRC complaints against U.S. arms transactions with Taiwan.

Export Potential

The question remains of how independent an arms manufacturing capability Taiwan can realistically pursue and how determined it is to really commit large amounts of capital to such efforts. The key to Taiwan's continued political independence is the American connection. Despite the withdrawal of diplomatic recognition, the United States still supplies arms. Any attempt to drastically alter Taiwan's military balance with the PRC would have to be very carefully considered in light of its potential impact on the US-PRC-Taiwan triangle. If the Taiwanese seek to enter the export market in a major way in order to spread the costs of their defense base, they will face additional problems. Because all but 23 nations recognize the PRC, most countries would think twice before antagonizing the government they do recognize. Moreover, Taiwan's technological capability depends almost entirely on U.S. designs or license agreements, thus giving the United States a vote over foreign sales. It seems highly unlikely that the United States would approve sales of any of this equipment, however cosmetically modified, unless drastic changes in the U.S.-PRC relationship take place.

Thus, to become a major exporter, Taiwan would face the formidable task of developing new weapons from scratch. Although several years ago one could say, "The ROC's technology base, particularly in shipbuilding and electronics, promises to help elevate the country's defense production capacity in the coming years," today that promise remains unfulfilled.⁵⁰

Only the aforementioned F5s licensed from Northrop and the three Taiwanese planes have become realities. Yet, of the three indigenous aircraft, only the T-CH-1 two-seat turboprop trainer has reached production. The XL-2, a twin turboprop transport, has had one known flight and the XAT-3 fighter/trainer program to date has shown no tangible results.⁵¹ Taiwan has only two types of indigenously designed warships-- a troop transport capable of carrying 500 and a seventy-foot long fast attack craft (of which only two appear to have been built).⁵² This ship is apparently armed with the so-called Hsiung Feng (Male Bee) anti-ship surface-to-surface missile. However, this missile appears to be a license-built version of the Israeli Gabriel missile and the ship itself is said to bear close resemblance to the Israeli Dvora.⁵³

Political Implications for the U.S.

In short, despite claims of multi-million dollar program plans, the verdict on Taiwanese military production--and thus export potential--is, at best, "not proved." Indeed, some foreign affairs officials remain highly skeptical of occasional Taiwanese announcements about large sums of fresh capital going for defense research. Such announcements seem a public relations effort in large part designed to keep up internal morale among Taiwan's populace. Taiwan also has scrupulously avoided violating in any way

the U.S. requirement for prior approval before selling U.S. supplied weapons or technology to a third country.

What then should U.S. policy be? It appears that the present policy remains valid. The United States should firmly stick to the principle that the ultimate solution to the Taiwan problem must emerge from the interested Chinese parties in a peaceful manner. If the parties adhere to this prescription, the United States can continue to supply defensive arms to Taiwan and to maintain, but not increase, the current level of arms sales. Even this approach requires delicacy because the PRC can be expected to try a "salami cut" tactic toward U.S.-Taiwan links. It appears that Taiwan will develop the capital and technological base to become at least a mid-level weapons producer and potential salesman. If the strength of the U.S. commitment to the present process comes to be doubted, Taiwan may very well choose to enter the arms supply market. As present, Taiwan remains only a potential arms merchant.

CHAPTER IV

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CHAPTER V

SUB-SAHARA AFRICA: REPUBLIC OF SOUTH AFRICA

The Republic of South Africa is strategically positioned on the southern tip of the African continent. The overriding concern of the country stems from its racial mixture and the attitude of the ruling group, the Afrikaners, toward its black population. Whites constitute almost 18 percent, Coloreds (of mixed origin) about 9.5 percent, Asians (chiefly Indians) some 3 percent with the vast majority of the population being black.¹

Settled by people of Dutch, Huguenot and German descent, called Afrikaners, in 1652, the land was taken over by Great Britain in 1802. The British and the Afrikaners fought frequently, finally leading to a British victory during the Boer War.² South Africa eventually became a member of the British Commonwealth, leaving that arrangement in 1961 to become a republic.

After World War II, the white Afrikaner minority imposed a policy of apartheid, a total separation of nonwhite races from political and economic power. This policy was repugnant to many of South Africa's allies, especially Great Britain and the United States.

During the 1970s South Africa moved toward a policy of Separate Development, designed to transform South Africa's black "homelands" into sovereign states based on ethnic and language commonality. These nine

"homelands" are small and occupy some of the poorest, least desirable areas of South Africa.

Recently, Prime Minister P. W. Botha has taken steps to improve relations with the Coloreds and Blacks. He has eliminated some of the "petty" forms of racial segregation, increased participation of the Coloreds in the Parliament, and discussed expanding the area of land allotted to the "homelands." The Coloreds have accepted their new enfranchisements with mixed reactions. They see this as a positive step for themselves, but a continued denial of extending political rights to blacks. This racial disharmony in South Africa has isolated it among the other black African states and made it a target of the Organization of African Unity (OAU). The OAU has developed considerable political clout against South Africa in the United Nations General Assembly.

To understand South Africa's role in southern Africa requires a discussion of its neighbors directly across its 1100 mile northern borders. Namibia and Angola lie to the northwest. Botswana, largely composed of the Kalahari Desert and not a political or military factor is situated due north while to the northeast lie Zimbabwe, formerly Rhodesia and the Marxist-governed nation of Mozambique. South Africa's greatest difficulty currently concerns Namibia, which in the 1970s the United Nations and the World Court declared independent of South African administration.

Nonetheless, South Africa has continued occupying Namibia, confronting military pressure coming from the leftist guerrilla South West Africa People's Organization (SWAPO). SWAPO operates from bases in Angola to the north of Namibia. South Africa claims independent elections cannot be fairly held in

Namibia as long as SWAPO units intimidate the Namibian people. South African troops have attacked SWAPO units in Namibia and Angola for the past 16 years. A sanctuary for the guerrillas exists in Angola where an estimated 20,000 Cuban troops provide military assistance and support.³

South Africa has a "history of connections" with a guerrilla group called the National Union for the Total Independence of Angola (UNITA). UNITA, headed by Jonas Savimbi, controls a large part of southern Angola and reportedly receives logistical support from South Africa. Dedicated to the overthrow of the Angolan government in Luanda, UNITA confronts the Cuban forces who stand between them and their objective.⁴

Zimbabwe, formerly Rhodesia, came under black rule in 1978 after bloody insurrections, negotiations between Robert Mugabe and Joshua Nkomo who headed rival guerrilla movements, and elections that made Mugabe chief of state. In the struggle for power, South Africa had strongly supported the Rhodesian white government, providing it with arms and supplies.⁵ Mozambique provides sanctuary for a black liberation group known as the African National Congress (ANC), pledged to fight the South African government. South Africa has banned the ANC which is closely linked with the South African Communist Party. South African military forces have made incursions into Mozambique, attacking ANC guerrilla bases.⁶

National Defense

South Africa's external and internal security problems stem directly from its social policy of apartheid. Despite its recent reforms, the Government

continues to face strong pressures to move toward more comprehensive integration of the blacks into mainstream politics. Since South African troops quelled the 1976 black riots in the Johannesburg suburb of Soweto a rising wave of black activism has forced the government to keep its police and army in a high state of readiness. The share of Gross National Product devoted to defense has doubled since 1970.⁷

More than any other single event, the 1977 United Nations Security Council's unanimous vote for a worldwide arms sales embargo to South Africa prompted the South Africans to take aggressive steps to build up a self-sufficient domestic arms industry. At the same time, South Africa turned to Italy, France, and Israel, purchasing aircraft and naval vessels in spite of the mandatory UN embargo. South Africa has made great strides toward achieving self-sufficiency because it possesses much of the essential skills, technology, and raw materials needed to produce armaments of the largest and most sophisticated variety.⁸

South Africa is also nurturing its industrial staying power in the event of prolonged or increased embargoes. It has stockpiled a two-year supply of oil, accelerated oil exploration, and acquired a tanker fleet. It is third behind the United States and Canada in the production of uranium oxide and has installed a new, relatively inexpensive uranium enrichment process in a new pilot plant. Thus South Africa has both the resources and technology to produce nuclear weapons, although the government has announced it will pursue only peaceful uses of nuclear power.⁹

Defense Industry

The country established a Munitions Production Board in 1964, changing its name later to the Armaments Board. This organization controls the manufacture, procurement, supply, and defense research for the South Africa Defense Force. In 1969 the Armaments Development and Production Corporation (ARMSCOR) was capitalized with R100 million. South Africa then formed the Atlas Aircraft Corporation which, together with private enterprise, manufactured either local equipment or equipment built under license from abroad.¹⁰

The arms industry has achieved self-sufficiency in the manufacture of small arms, bombs, mortars, armored cars, a variety of vehicles, and a range of training and combat aircraft.¹¹ The Impala trainer aircraft, built under license from Italy, is a version of the Aermacchi MB-326 trainer. Atlas Aircraft has designed a single seat strike version of this aircraft designated the Impala MK II. It is a highly maneuverable, counter-insurgency fighter bomber.¹² Production of the French Mirage F-1CZ and F-1AZ fighters (air superiority and ground attack, respectively) has continued under a license arrangement with Avions Marcel Dassault.

The nature of South African defense requirements dictate heavy reliance on armored vehicles to provide a potent force against lightly protected guerrilla insurgents. Consequently, with French assistance, Sandock-Austral Pty. Limited has produced the AML-90 armored car and the Eland light armored car. It has now designed and produced the Ratel infantry fighting vehicle, an armored vehicle armed with a 20 mm gun, a machine gun and slots for seven

soldiers to fire through behind armor protection. This vehicle has been combat tested against SWAPO guerrillas in Angola with great success.

South Africans recently developed the G5 155 mm "Supergun" artillery piece and tested it with the help of the now bankrupt Space Research Corp. (registered in the United States and Canada and situated on the Vermont-Quebec border). ARMSCOR bought a 20 percent hare of the Canadian company through contacts in Belgium. George Bull, owner of Space Research sent ARMSCOR 155 mm shells and at least four cannon barrels as well as provided computer services for conducting ballistics tests. Bull was convicted of violating U.S. federal export regulations, sentenced to one year in jail and the firm was fined \$45,000 which was not paid because of bankruptcy.¹³ ARMSCOR also has developed a highly mobile version of this cannon called the G6, mounted on a specially developed six-wheel armored vehicle. This vehicle also is fitted with grenade launchers and a light anti-aircraft machine gun. The vehicle can travel at 50 mph on highways and 25 mph across rough terrain. Its gun can fire accurately up to 25 miles. The vehicle will take three or four years to put into production. ARMSCOR officials hope to export the G5 and G6 to other countries to help offset the \$10 million cost of development.¹⁴

Another sophisticated South African produced artillery piece is the 127 mm artillery rocket system, based on the Soviet-designed Russian Stalin Organ. Mounted on trucks, the 24 rocket tubes can unleash devastating firepower. The South African used this weapon effectively against Cuban troops in Angola.¹⁵ Sandock-Austral Pty. Limited is producing the Israeli Reshef

class large patrol boat in Durban and also the French/German JoaoCoutinho frigate.¹⁶

ARMSCOR produces the Cactus surface-to-air missile system, originally designed by the French with South African funding. South Africa also builds the acquisition and guidance radar for this system. Little is known about South Africa's air-to-air missile development and production capability, but the Whiplash air-to-air missile reportedly is of South African design.¹⁷ As noted at the outset of this study, the South Africans have produced the Scorpion missile, placing them on several operational naval craft.¹⁸

Arms Imports and Exports

Prior to 1961 South Africa, as a member of the British Commonwealth, tended to procure all of its arms from Britain. After establishing itself as a republic, it tended to procure primarily from France. The South Africans now have cooperative manufacturing projects, particularly naval patrol boats with Israel. Italy has also participated in licensing arrangements for the Impala jet trainer aircraft. Since the 1977 UN arms embargo, France has sold over \$100 million in arms to South Africa. These include Mirage III jet fighters with air-to-surface missiles, helicopters, transport aircraft, AMX tanks, AML armored cars, and three Daphne class coastal submarines.¹⁹ South Africa proved the largest importer of Israeli-made arms.²⁰

South Africa has just begun to shift to becoming an arms exporter based on its growing defense industry. Claiming to be the tenth largest producer of arms in the world, ARMSCOR sends salesmen abroad with goals to expand their

\$8.6 million arms export business to an initial target of \$130 million. The government follows a policy of selling to foreign countries that are neither communist nor hostile to South Africa. Potential markets are Latin America, the Middle East, the Far East and Africa. In addition to the G5 155 mm artillery piece (capable of firing a tactical nuclear warhead), South Africa hopes to sell missiles, armored cars, troop-carrying vehicles, fast missile-firing boats, and sophisticated telecommunications equipment.²¹

South Africa's extreme secrecy about its foreign arms markets makes it very difficult to determine which countries buy South African weapons. In 1980 the Popular Front for the Liberation of Saguiet al-Hamra and Rio de Oro (Frente POLISARIO) captured South African equipment from the Moroccan army in its six-year old war for the Spanish Sahara. They found South African Ratel infantry fighting vehicles and Eland light armored cars. Morocco was especially sensitive to this finding because as a member of the Organization of African Unity and the Arab League, it should oppose trade with South Africa.²² Morocco purchased these arms when the United States and France refused to sell arms that Morocco could have used in the Sahara conflict.

In summary, South Africa, the third largest exporter of weapons among newly industrialized countries in the period 1977-80, trailed only Brazil and Israel.

Regional Political Implications

As mentioned earlier, South Africa has estranged itself from the black-ruled nations bordering it on the north by pursuing a modified policy of

apartheid. [The significance of recent "softening" of the apartheid policy appears to be a short term victory for Mr. P. W. Botha's white minority government. This "softening" has consisted of increasing the rights of blacks to move more freely throughout the country, the abandonment of some petty segregationist laws, incorporation of the 3 percent Colored minority into a weak parliamentary role and the continued development of the "homelands" philosophy. Whether this is enough to appease the restless black majority remains to be seen].

Chief Gatsha Buthelezi, the most important black leader allowed to operate in South Africa had urged the Coloreds to reject Botha's plan to include them in a token role in the government. However, the Coloreds accepted the offer rationalizing that it will give Coloreds a political platform from which to negotiate for further reforms.²³

Zimbabwe and Mozambique are less troublesome to South Africa now than in recent years. Even though these countries are unfriendly to South Africa, they respect the superior combat power of the South Africans.

South Africa has begun exploiting its economic power to improve its political relations with these and other black African states. Mozambique is economically dependent on South Africa for jobs for its migrant workers and the transit of South African goods to its ports.

Economic Implications

South Africa has a powerful economy when compared to any other African nation. It is a net exporter, averaging approximately twice as much as it

imports, excluding gold. Its major exports include gold, wool, diamonds, corn, uranium, metals, metallic ores, and asbestos. South Africa boasts the best telecommunications on the continent with over a million telephones, 2.5 million radios and a million television sets. It also has a satellite station with Atlantic and Indian Ocean antennas.²⁴

With its expanding defense industrial base, South Africa is looking for opportunities to export arms, munitions and sophisticated weapon systems to defray the large investment required for such undertakings. Selling arms to others will offset the research and development costs, reduce the unit cost of production, and provide trade benefits. The degree of success South Africa achieves in exporting arms will largely determine how rapidly the defense industrial base can expand. Under any circumstance, it appears the defense industry will continue to be viable out of sheer necessity for survival in this troubled continent.

Military Implications

While South Africa is the undisputed military power on the continent, the Pretoria government has used economic, as well as military force to achieve and strengthen security objectives. Even the Angolan-based Cuban troops, estimated at 20,000 have not been capable of confronting and holding areas against South African forces.

South Africa has over 3.5 million men fit for military service. There are 63,250 uniformed troops on active duty, including 45,000 conscripts. Paramilitary forces consisting of 90,000 commandoes are also available. The

annual defense expenditure is 2.3 billion, about 18 percent of the South African budget.²⁵

Even though there are African states with larger armies than South Africa, none can compete with the modern, well-equipped ground, air, and naval forces. The South Africans are seasoned troops, using combat-proven weaponry. South Africa carefully makes this point to potential buyers and offers to take them into the Namibian war zone to see the systems under combat conditions.²⁶

Political Implications for the United States

In a dinner toast in Harare, Zimbabwe, Vice-President Bush indicated on 16 November 1982 that peaceful change in the region is challenged by a climate of fear, distrust, foreign intervention, and cross-border violence. The United States' strategic objective in southern Africa is to help establish a framework of restraint.²⁷ During this same trip, he emphasized the United States objective is parallel and consistent with the security interests of all parties.²⁸ On the one hand South Africa's strong anti-communist policy supports U.S. goals for African developing countries. On the other, the U.S. does not want to antagonize Black Africa.

Economic Implications for the United States

The strength of their economy has put the South Africans in the enviable position of being able to ignore powerful countries desiring to influence the nation's internal policies. Gold, diamonds, rare metals, and minerals

combined with a highly developed transportation and manufacturing infrastructure to insulate South Africa from many of the harsh effects of world economic cycles. The United States is more dependent on South African exports than South Africa is dependent on U.S. imports. However, as was seen in the case of the G5 and G6 artillery pieces, South Africa does need the high technology so easily found in the U.S. for its growing arms industry. As South Africa increases the level of sophistication of its weapon systems, it must seek out the technical know-how if it is to compete in the world arms market.

Military Implications for the United States

South Africa is of strategic interest to the United States because of its geographic position, its resistance to foreign intervening forces, and the stabilizing effect its economy imposes on the Sub-Sahara region. The "front line" nations across its northern and eastern borders are extremely unstable and vulnerable to foreign influence. Namibia and Zimbabwe are coping with sharp transitions from white colonial states to black majority rule. Preserving the delicate infrastructure of white, privately-owned industries to provide stable economies for jobs and national security is a tough, political challenge.

South Africa has begun to realize that force alone is not the answer, even though force can be an effective short term solution. Southern Africa is being watched closely by the United States, Western Europe, the Soviet Union and the People's Republic of China.

South Africa's growing arms production capacity has reduced its dependence on other countries for military sales and aid. As they continue to emphasize domestic arms production, the U.S. must closely monitor this region and the implications of shifting balances of power.

CHAPTER V

ENDNOTES (Pages 109-121)

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CHAPTER VI

U.S. NATIONAL SECURITY IMPLICATIONS

One could argue that as a general threat to international stability the ongoing diffusion of modern military capabilities among middle-range powers, aided by increased arms production capacities, could prove more troublesome to U.S. interests than the wars of national liberation in the 1960s. The U.S. government regards local wars, revolutions, and civil disturbance especially in the Third World as potentially dangerous to U.S. security. These conflicts might invite Soviet exploitation or indirectly impinge on U.S. economic and political interests. The prospect of a growing number of arsenals among these middle and lower ranked powers could affect these national security interests in important ways.

Generalizations and Questions

Some generalizations and associated questions about the proliferation of arsenals throughout the world seem to merit discussion.

First, the history of mankind offers scant hope that nations wanting to prevent others from striving for greater self-sufficiency in arms will achieve their objectives. Countries aspiring toward arms self-reliance are more limited by their own economic and social weakness than by outside pressures. The competition among major arms suppliers ensures some source of assistance for those opting for building arsenals. Thus, internal conditions will prove more important.

Second, if newly industrializing nations are to forego efforts to produce their own arms, the causes of war and internal insurrection have to be removed. Facing external threat or internal turmoil, Third World nations have little option but to purchase arms abroad or try to produce arms domestically. Given the tensions and disagreements between nations, the chances of eliminating the roots of conflict in the foreseeable future remains remote. Clashes between ethnic and religious groups, between ideologies, between governments and rebels, as well as the continuing disputes over territory simply are too common to nurture a realistic hope of armed hostilities receding in the foreseeable future.

Given these conditions, certain perplexing questions arise. Are these newly industrializing countries feeding arms races among even less developed countries and perhaps prolonging or changing the course of wars (as South Africa might have done in the Falklands Islands war)? When Third World countries will be able to import arms manufacturing know-how from the newly industrializing countries, will the United States confront an even more unstable world? Indeed, are the major suppliers losing the ability to control the introduction of advanced weapons in certain regions?

Third, at present it is difficult to determine whether the proliferation of arms industries will prove stabilizing or destabilizing in any particular region. Stability depends upon a host of political, economic, and social factors, and not just on arms production. Nations do not have to build their own weapons in order to cause instability. Iraq, with a very small domestic arms industry but backed by imports from the Soviet Union, still attacked Iran

when it felt that this hostile action would serve its ambitions. On the other hand, South Korea's efforts have not resulted in tension on the peninsula over that which already existed. Nor has Brazil's program struck fear in the hearts of its neighbors. Although arms races have taken place within the Third World, between Israel and Arab neighbors and between India and Pakistan, one cannot conclude that within the next decade or so the growth of indigenous arms production will accelerate such contests any more than importing weapons from the major suppliers.

Yet, most likely some nations will continue to seek to attain regional leadership, using local arms production to assist them in this endeavor. For example, India seems to desire such a preeminent role in South Asia and around the Indian Ocean. It recognizes that military power supports such ambitions. Thus, when the Chinese Communists defeated its troops in 1962 or when the United States halted arms shipments to both India and Pakistan during their war of 1965, India saw the penalties of relying heavily on outsiders for arms and the need for greater self-reliance. If in the future Brazil and Argentina intensify their rivalry for leadership in Latin America, their respective abilities to produce arms could affect the outcome. Whether drives for leadership trigger significant instability still remains an open question.

Fourth, nations continue to view increased domestic arms production as one way of achieving greater freedom of action. For example, nations reason that the more they can provide their own weapons, ammunition, and spare parts, the more they can make up losses sustained in combat from controlled domestic sources. Hence a major supplier like the United States would find it more

difficult to prevent another country from launching a war of which the United States disapproved. In the past, a supplying nation's arms embargo caused the armed forces of an attacker to run out of ammunition and spare parts after a short period. With domestic production, the attacking country could continue armed hostilities for a longer time, perhaps long enough to attain its political objectives. Yet, there are limits to achieving total, or even great, freedom of action. Because wars tend to be intense with belligerents incurring heavy material losses, the attacking nation would require considerable arms production and previous stockpiling, a requirement beyond the reach of most. Moreover, the advanced countries, for the most part, produce the most modern military technologies, requiring newly industrializing countries to continue to depend on them for weapons and arms manufacturing designs. Consequently, significant dependencies remain. But with domestic arms production, nations have greater freedom of action than without it.

Closely associated with greater freedom of action, some newly industrializing countries try to use the sale of indigenously produced arms as diplomatic instruments. Both Israel and South Africa attempt to exploit arms sales to open up or to maintain friendly relations with countries that otherwise might shun them. Israel has exported arms to several countries in Latin America and in Africa with this purpose in mind. In a strange turn of events, Israel shipped some selected military items to Iran during the war with Iraq, apparently in the belief that someday Iran will replace the anti-Israeli regime with one potentially more sympathetic to Israel. It wanted to demonstrate its good will to the Iranian people in the time of

trouble, thereby easing the task of an eventual rapprochement with Iran. As other newly industrializing countries achieve a more potent arms export capability, they no doubt also will attempt to gain diplomatic leverage.

Fifth, the tendency of some major arms suppliers, especially the United States, to set ceilings on total arms sales as well as to place conditions on the arms they did sell proved an important stimulus for newly industrializing countries to see to build their own arsenals. When the United States in 1977 decided to eliminate most U.S. Military Assistance Advisory Groups (MAAGs) and Military Groups (MILGPs), it led several countries to conclude that they could no longer rely on military-to-military relationships to obtain the arms that they felt they needed. President Carter's unilateral attempt to police the world's arms traffic and to punish countries guilty of human rights violations through denial of arms sales, further reinforced their determination to seek greater arms self-reliance. As we have noted, South Africa embarked on a major arms production build-up to counter an international arms embargo. One other consequence was the increased opportunity for the Soviet Union to expand political influence through the sales of arms, although the Soviet Union did not transfer much manufacturing know-how, (except in the case of India). In 1981, the Soviets concluded arms sales agreements with 18 countries in the Third World. Soviet sales to Cuba and Peru exceeded all U.S. arms exports to Latin America. Although the motivations behind a U.S. policy of using arms sales to improve behavior of prospective buyers were noble and in some cases U.S. denial had its effect, overall it ended by prompting those nations who had an embryonic ability to pursue the growth of indigenous arms industries.

Sixth, no matter how energetically newly industrializing countries succeed in building indigenous arms manufacturing capabilities, their output cannot change the nature of total world production in any critical way within the next decade or two. The major suppliers will continue as the chief sources of armaments. On the other hand, as the outset of this study noted, even limited production capabilities could seriously affect regional power relationships. Regardless of the source, developing countries are looking for arms to expand and modernize their forces, and in some instances they will prefer other Third World countries to the major suppliers. In some cases exports by newly industrializing countries will help stabilize regional power relationships while in other instances they may upset equilibria. The preceding pages have noted specific cases where either occurs.

Neither can the newly industrializing countries discussed here, including Israel, soon achieve true arms independence. Despite Israel's plans to move ahead with the production of the Lavi fighter aircraft, it still wants to import F-16 aircraft from the United States and depends on U.S. sources for jet engines and other equipment. Likewise, because many of its most exportable military products contain technology of U.S. design, it still requires U.S. permission to export many of its indigenously produced military wares. In theory, a major weapon supplier has the ability to determine the quality and modernity of an industrializing nation's defense industrial sector by controlling the transfer of technology. However, given the many competing sources for such technology in the world today, to deny the importing country that know-how, a major suppliers must obtain an agreement from all to deny

that transfer, a most difficult task. By and large, competition among major arms exporters makes an embargo by any one of them difficult to enforce. Nonetheless, a major supplier still can influence quality because of many factors, including the reluctance of importing countries to upset existing technical relationships, the larger political considerations that underlay arms arrangements, and economic conditions relating to the costs and terms of trade of arms manufacturing exports. In sum, while the major arms suppliers cannot prevent the growth of indigenous arms industries, newly industrializing nations still must come to them for the latest technology. As long as the major producers carry on vigorous R&D programs and incorporate their results into new weapons, newly industrializing countries will encounter problems in achieving the same level of state-of-the-art competition.

Seventh, newly industrializing countries having the capability to build an arms industry have arrived at what Walt Rostow once labeled to takeoff stage of economic growth.¹ Domestic industries provide jobs, thereby, becoming an important economic asset. In the defense sector, those jobs often involve a knowledge of advanced technology that contributes so much to economic progress under modern conditions. These countries enjoy certain advantages. They generally have an abundant supply of relatively cheap labor, land and natural resources. Governments also seem willing to supply the needed capital. On the other hand, they suffer from an inability to generate their own technological innovations and to exploit technology as rapidly as the more advanced countries. Yet, several industrializing countries, such as Israel and South Africa, have manufactured weapons using the most advanced technology, some of which they developed themselves.

Eighth, nations building domestic arms industries sooner or later usually seek to export their military products and in the future most probably they will export arms manufacturing know-how. By increasing production runs, they reduce unit production costs and earn badly needed foreign exchange. Yet, there are instances where large arms producers do not export much. India, for example, has relatively few foreign arms sales, requiring much of their production to satisfy the demands of the Indian armed forces and believing that the political penalties outweigh the economic advantages.

Newly industrializing countries enjoy certain comparative advantages in the international arms trade. Because of lower costs of land and labor, they can now compete effectively in sales of lower technology items such as ammunition. Not as sensitive to environmental requirements, they can reduce costs by not investing in expensive anti-pollution devices in their manufacturing processes. On the other hand, they suffer from an inability to generate their own technological innovations, lag behind the West and Japan in exploiting new technology, and often lack the high level of managerial competence needed to run successful defense industries. Yet, several countries, such as Israel, are building weapons that incorporate state-of-the-art technology and have created managerial cadres equipped to handle the demands of a modern defense production enterprise.

Thus far, increasing worldwide production of arms has had little impact on the U.S. defense industrial sector. Only some 3 percent of this nation's work force in 1975 related to the export of arms. Of the top ten arms manufacturers in 1977, only one, Northrop, counted heavily on foreign sales,

some 25 percent of its business. The Congressional Budget Office points out that large savings generally do not result from U.S. foreign military sales and that the volume of high technology export has not led to savings in the U.S. defense budget.

Yet, the United States now finds its friends and allies competing more effectively in the international arms market. This competition affects both civilian industries (which are called on to support defense efforts) and the defense industrial sector. As is well known, the U.S. electronics industry, on which this country counts so heavily to pull it out of its current economic distress, now meets increasing foreign competition. Taiwan and South Korea have replaced Japan as the largest producers of these components for modern avionics, command, control, and communications equipment as well as computers. The United States may never recapture this market.

CHAPTER VI

ENDNOTES (Pages 124-132)

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CHAPTER VII

U.S. POLICY OPTIONS

The foregoing generalizations paint an environment in which the United States must fashion its policy regarding the growth of defense production capabilities among an increasing number of newly industrializing countries. Certain options make little practical sense. This country cannot ignore what is going on. Its national security interests range too widely for it to adopt a hands-off policy or allow its private defense contractors to make any kind of arrangements with any country willing to pay for the transfer of manufacturing know-how. Yet, we can expect nations to continue to ask U.S. assistance and the United States must be prepared to make some hard decisions. Nor can the United States adopt a policy of indiscriminate, wholesale aid to any country wanting to start or increase efforts to produce arms locally. Little good would come from uncontrolled proliferation. Thus, the practical options open to the United States fall between these extremes.

Two options seem to offer sensible courses of action for the United States and taken together offer a useful two-track approach. First, the United States can subscribe to the ideal of holding back indiscriminate proliferation of arms production capabilities and do what it can to achieve this objective. For example, it might encourage regional conferences in which neighbors would agree to limit their arsenal expansion. However, as stated in the introduction to this study, a rigid, blanket prohibition would prove unworkable and counter-productive. If the United States cannot effectively

prevent such growth, and it cannot, it will look impotent trying to do so and failing.

Second, as suggested in the introduction, the United States should tailor individual policies to specific countries, either denying them manufacturing knowledge or aiding them to reach their arms production goals. Such an approach seems paradoxical in terms of its companion policy option. Yet, reality demands that this country must be selective in providing assistance. It should help another country build its arms industry only when U.S. national security interests would be served thereby. It should not do so merely for economic gain. Assisting South Korea may make sense because a domestic arms industry would assist that allied country in withstanding a possible North Korean attack. Helping South Africa may incur too severe political penalties to prove worthwhile. The United States might see wisdom in adopting a sympathetic policy toward a politically and economically growing Brazil, but discourage arms production in other Latin American countries, especially if they are prone to try to settle outstanding territorial disputes by military means.

In making specific determinations under such a dual tracked policy, the United States could usefully follow the following guidelines. First, this nation naturally should consider the impact of a newly industrializing country's arms industry on U.S. national security interests worldwide. Second, it should consider the normal questions of internal security of the new arms producers as well as the impact of increased weapons manufacturing on its ability for self-defense. Third, the probable impact on possible drives

by such a country for regional hegemony or territorial expansion rates high on the list of considerations. Fourth, the effects on possible Soviet influence in that country or in the region deserve serious thought. Fifth, the United States must assess whether denial of assistance will prompt nations with arms production aspirations to seek aid elsewhere, including the Soviet Union, with consequent political and economic losses to the United States. As a rule of thumb, those friendly industrializing nations capable of achieving arms production without a U.S. relationship probably should receive U.S. assistance. Such collaboration would increase the ability of the United States to influence the path of that arms manufacturing in ways that accord more closely with U.S. interest.

Lastly the United States also must consider the industrial mobilization opportunities presented by a growing number of arsenals in friendly hands. In peacetime such arsenals often appear as competitors to U.S. defense firms both abroad and in the United States. Yet, should a large scale national emergency or war demand large quantities of war supplies as quickly as possible, this additional productive capacity could prove very useful. In some instances it may be preferable to tap industries in allied countries already devoted to defense production rather than lose time in converting U.S. civilian industries to military purposes. Sometimes the location of that production will be closer to the theater of operations, thereby reducing transportation time and requirements. For example, if called on to conduct a relatively lengthy war in the Persian Gulf, this country might use Australian or Israeli production repair and overhaul facilities. In peacetime because of economic

consideration, it becomes difficult to conclude arrangements that would bring about the expeditious use of such foreign manufacturing capabilities; yet, the potential is there. Through co-production, licensing arrangements, and selling U.S. turn-key plants, this country could encourage the build-up of factories abroad that produce U.S. military items needed by U.S. forces.

However, even if the United States proved highly adept in making its selections, knotty problems and issues will remain. Up to the present time major arms suppliers enjoyed the advantage of at least partially controlling the initial length of a conflict that their customers might launch. If the exporter believes that the war damages its national interests, it can halt the flow of ammunition and spare parts. However, as alternative sources for these military items grow, the ability of advanced industrial countries to dictate the duration of a war diminishes along with their diplomatic leverage. Although not proving even near decisive, the shipment of indigenously produced arms by newly industrializing countries to Iran helped keep its war with Iraq going. Should Taiwan conclude that the United States no longer is a reliable source of arms, it could turn elsewhere, and in the process U.S. influence with the Taiwanese would wane.

To paraphrase Thucydides, the strong do what they will, but the weak will do whatever they can. As long as the major exporters do not forego arms production, newly industrializing countries see no example of arms manufacturing restraint, and thus, probably will opt for greater self-reliance.

CHAPTER VIII

SUMMARY

The growth in arms production among newly industrializing countries, while not dramatic or decisive in global terms, is proving important to international relations in general and to U.S. national security interests in particular. In all likelihood, these capacities will grow, but not come near matching those of the major arms suppliers in the coming decades. In specific regions and at specific times such manufacturing prowess could affect the course of history. Up to the present this new industrial dynamic has had a limited impact, but it could prove more influential in the future. At any rate, the United States is well advised to pay closer attention to this development and to fashion policies that seek to ensure that new arms production support rather than conflict with its national security goals. No single grand policy will prove effective. Instead, this country should follow a two-tracked approach, striving to lessen the proliferation of arms industries on a global scale, but deciding whether to give assistance to weapons production aspirants on a case-by-case basis to individual countries in light of what it perceives are its interests.

APPENDIX

DEFENSE PRODUCTION

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY		
Argentina	I	Fabrica Militar "Rio Tercero" (Cordoba) cont'd	"Tam" Tank	Yes	West Germany/ Thyssen-Henschel		See Note	Possible Sales to Pakistan and PRC. TAM design based on West Germany "Maradta"	
		Fabrica Militar De Polvoras Explosivos "Villa Maria" (Cordoba)	"UCT" Combat Vehicle "Mathodo" ATGM	Yes	West Germany			Wire-Guided; Derived from FRG "Cobra;" Solid Propellant	
			Gunpowder						
		Hispano Argentino Fabrica Des Automoviles/Mercedes-Benz Argentina S.A. (Buenos Aires)	Explosives Solid Propellents						Solid Propellant used in the "Mathodo" ATGM
			17 ton truck	yes	West Germany/ Mercedes-Benz				
		Fabrica Militar De Avellaneda (Buenos Aires)	3 ton truck	yes	West Germany/ Mercedes-Benz				
			Electrical Equipment						
		Fabrica Militar De Synthetico, toluene, compans (Buenos Aires)	Explosives Solvents						

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All explanatory notes are listed at the end of the tables beginning on p.199.

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY	
Argentina	I	Fabrica Militar De Material De Comunicaciones (San Martin)	Tactical Communications Equipment "Mowag" APL ANX-13 Light Tank	Yes	Switzerland			
		Fabrica Militar De Armas Portatiles (Rosario)	9mm Machine Pistols 7.62mm Automatic Rifles 105mm Cannon	Yes	France			
		Fabrica Militar Fray Luis Beltran (Rosario)	20mm Ammunition 40mm Ammunition	Yes	Belgium			
		Metallergird Centro SCA (Bueno Aires)	9mm Pistols 45mm Pistols					
		Fabrica Militar De Materiales Pirotecnicos (Buenos Aires)	Fuses Explosives Ammunition					
		Fabrica Militar "Rio Tercero" (Cordoba)	120mm Mortars and 35mm cannon Gas Thrower Ammunition Large Caliber Artillery Tank Parts	Yes	France/Thomas-Brandt, and Switzerland/Cerlikon-Buhrle			

Possible sale to El Salvador

See Note

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
Argentina	II	State Shipyards and Naval Factories (AFNE)	Destroyers Type-42 Frigates	Yes	UK				British Design, Sheffield Class British Design
		RIO Santiago	Submarines a. Type-209 b. "Salta" Class Missile Corvettes Meko 360 type Transports IA-58 "Ducara" counter- insurgency strike aircraft	Yes	FRG/ Reinsthal- Nordseewerke FRG Blohm und Voss				FRG Design, assembled in Argentinian
	III	Fabrica Militar De Aviones (Cordoba)	Cesana Light Aircraft IA-62 Light Trainer	Yes	U.S./Cessna FRG	Unk	Uruguay		French Turbo props may be replaced with U.S. Garrett TPE 331- 11 Engines producing at a rate of 18 per year, over 50 have been produced.

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY		
Argentina	III	Cicare Aeronautica Representaciones Aero Comerciales Argentina Chincol Armed Forces Scientific and Technical Research Center (CITEFA)	IA-63 Jet Trainer	Yes	FRG/Dornier			Prototype in 1983-84, production in 1985, will be constructed mostly from Argen- tine components. Possible U.S. Garrett TFE 731-3 engines.	
			Helicopters						
			Helicopters	Yes	U.S./Hughes			Huges Model "500"	
			Piper Trainer	Yes	U.S./Piper				
			Anti-Tank Guided Missile "matbobo"	Yes	FRG			Production in 1979	
			Artillery-launched Rocket "Pampero"						

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY		
Brazil	I	Engesa (Engenheiros Especializados, S. A.)	EE-3 "Jararaca" Command vehicle				Lybia	Wheel and tracked vehicles from Engesa have proved popular with a number of countries. Many countries have purchased a mix of vehicles with Cascavel and Urutu of Central interest (e.g., Iraq: 1500; Lybia 400; Columbia 200; Qatar 20).	
			EE-9 "Cascavel" Armored car				Qatar		
			EE-11 "Urutu" Armored personnel carrier				United Arab Emirates		
			"Gurgel Zavante" Armored Vehicle				Iraq		
			EE-15, 25, 50 Military Trucks				Guyana		
			EE-17 "Sucuri" Tank Destroyer				Columbia		
			EVL-36 90 mm Gun and Turret				Bolivia		
			Explosives Small Arms Ammunition				Chile		
		Imbel (Industria Material Belico Do Brazil) - A State Owned Company Designed to Orchestrate and Oversee Arms Manufacturing and Investment.						Belgium has assisted and worked with Brazil for a number of years in the Small Arms Arena. Italy has also been involved in this area.	
		Mekanika Industria E Comercio	7.62x51mm Machine Gun "Uirapuru"						

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Civil Cont	I	Bernardini Industria E Comercio S.A.	Tanks					
		Piselli - Venturas E. Equipamentos Industrias, LTDA.	Trucks, Tank/Vehicle components					
		OTO Brasil, S.A.	Guns					
	II	Esabras	Niteroi Class MK-10 Guided Missile Destroyer	X	Great Britain (Vosper Thornycroft)	10	Chile	Esabras coordinates the activities of the largest shipyards in Brazil.
III			Patrol Boats					
			Corvette	X	W. Germany			
		Embraer (Empresa Brasileira de Aeronautica, S.A.)-A Joint Government/Private Company Producing Both Civil and Military Aircraft	EMB-110/111 "Bandeirante" EMB-121A1 "Xingu" II EMB-121 "Xingu" Light Transport EMB-312 "Tucano" (T-27) Trainer			41	Guyana Chile France	Pratt & Whitney PTCA-27 Engine from Canada. Pratt & Whitney PTCA-135 Engine from Canada.
			EMB-326GR "Xavante" Jet Trainer/Ground Attack Fighter	X	Italy			Variant of MB-326; Brazil has marketing rights in Africa.

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
III	III		AM-X Light Attack Fighter Bomber		Italy (Afritalia; Aermacchi)				Joint Development.
			Flight Simulator						
		Maiva - A Private Company	T-25 Universal I Trainer				10	Chile	Product under development.
			N-622 Universal II Trainer						
IV		Aerotec - A Private Company	T-23 "Uirapura" Trainer				18	Bolivia	
			A-132 Uirapura II				20	Paraguay	
		Bolthrus - A Jointly Owned French and Brazilian Firm	AS-350 Ecureuil Helicopter	X	France (Aerospatiale)			Chile	
			SA-315 Lama Helicopter					Chile	
		Sistemas Ferranti Do Brazil-Subsidiary of Ferranti Computer Systems	Installation of British Electronics (Fire Control Information & Surveillance Radar) For Navy Corvettes (German Design)		Great Britain			Bolivia	

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
U.S.S.R.	IV	Avibras-Industria Aero-spacial S.A.	SBATO-70 70mm Air-to-Surface Rockets						
			SS-06 100mm Surface-to-Surface Rockets						
			SS-60 300mm Surface-to-Surface Rockets						
			X40 Surface-to-Surface Missile					Iraq	
			MAS-1 Air-to-Surface Missile					Iraq	
			Cobra Anti-Tank Missile	X	West Germany				
			Roland II Surface-to-Air Missile	X	France/West Germany				

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
INDIA	I	Bharat Electronics, Ltd. Heavy Vehicles Factory at Avadi	Bofors L-70, 40mm anti-air- craft	XX	Sweden			400-500 built	
			Superfledermaus weapon control system for L-70	XX	Contraves (?)			Indian version known as "Ishapur"	
			9mm Sterling SHC	XX	Sterling-U.K.			Indian Design	
			7.62mm FAL auto rifle	XX	FN Belgium			Indian produced	
			7.62 LMG					Indian design	
			81mm mortar					Indian produced	
			105mm Field Gun						
			75/24 pack howitzer						
			Main Battle Tank	XX	Vickers, U.K.			Indian version known as "Vijayanta"	
			SS-11-B1, anti-tank	XX	France			Agreement reached to produce under license	
		84mm Car Gustav anti-tank			Sweden				

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UNIT:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
	II	Mazagon Docks Ltd. (MDL)	Frigate - Godavari class					Indian design-first of three already built
		MDL	Frigate - Leander class					believed to be built with foreign design, probably U.K. Last Leander Frigate already built and program ended.
		MDL						Modernization and over-haul of aircraft carrier "Vikrant"
		MDL	Offshore patrol boat 74mm long 1100 ton disp.					Indian design; ordered by Indian Coast Guard one built
			Sonobuoy					Indian design
			Shipborn surveillance radar					Unknown design
		MDL	Submarine	XX	HDW-West Ger-many			two to be built under license after two have purchased

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
	III	Hindustan Aeronautics, LTD. (HAL.)	MIG 21M	XX	USSR			Last one produced 11/81 after 8 yr production run
		HAL.	MIG-21 bis	XX	USSR			Currently producing
		HAL.	MIG-21 FL	XX	USSR			production stopped
		HAL.	MIG-23	XX	USSR			assembling in India
		HAL.	Mirage 2000	XX	France			plans are to assemble/ build 60-70 following purchase of 40
		HAL.	Jaguar	XX	U.K.			40 purchased; 45 to be assembled
		HAL.	Chetak (Alouette III heli- copter)	XX	France Aero- spatial			producing
		HAL.	Cheetah (Lama helicopter)	XX	France-SNIAS			
		HAL.	Adour jet engine for Jaguar	XX	Rolls Royce- U.K.			Starting assembly from kites plans are to have 20% locally produced in 2 years and 80% eventually

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
INDIA	III	HAL	Ajeet fighter					Believed to be Indian modification of U.K. design
		HAL	Gnat fighter		U.K.			
		HAL	HF-24 Marut MK.1 fighter					
		HAL	HS 748, Transport					
		HAL	Kiran jet trainer					
		HAL	HT-2 prop trainer					Believed to be Indian design
INDIA	IV	that HAL working on Indigenous Light Combat Aircraft and Advanced Light Helicopter to include engine for the helicopter						Indian design
		Bharat Electronics, LTD. (BEL)	TRS 2210 Matador Radar 3-D and mobile	XX	France/Thompson-CSF;			
INDIA	V	BEL	PSM-33, mobile 3-D radar					Indian design, currently produced
		High Explosives Factory at Khadki	"C" fuel for rockets & missiles. Liquid					

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DEFENSE PRODUCTION

III:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
	VII-Space Programs	These programs under the Indian Space Research Organization (ISRO)	Satellite launch veh. APPLE satellite into orbit Bhaskara II satellite	LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	indigenous design-launched 38 kg satellite 5/81 launched 6/81; experimental for communications; launched from French Guiana launched 11/81; indigenous design last exp. satellite; earth observation	

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
Israel Cont	I	Israel Aircraft Industries	AAA Fire Control System - SPIDER-II						be utilized. Range of the 160 system is 30,000m and the launching element has 24 tube.
	II	RAMTA (Division of Israeli Aircraft Industries)	DABUR Boat	*	*U.S./Swift-ships(only for initial units)		Argentina	The fire control system for the TCM-30G twin 30mm cannon turret is called SPIDER-II. The system which uses both radar and optronic acquisition and tracking provides automatic ballistic production for all gun calibers from 30mm to 57mm. Radar range performance is claimed to be 19km against targets with small radar cross sections flying at low level.	
									DABUR is a small (65ft, 35 ton displacement aluminum hull patrol boat utilized by special

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel Con't	I	URDAN RKM and Israel Military Industries	Tank uprating					in the Free World. Upgrading M-47 tanks. Tanks will have new engines, a 105mm gun and a new fire-control system. The conversion will bring the M-47 up to the standards of the M-60A3 tank.
		Israeli Military Industries (IMI)	160mm Artillery Rocket System					*After an international competition, the Venezuelan Army has decided to adopt the 160mm Artillery Rocket System designed and built by IMI. The company will supply 25 complete systems at a total price of about \$83 million U.S. The system ordered by Venezuela will be supplied mounted on tank chassis. As the V.A. uses AMX-13 light tanks, it seems likely that this chassis will

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY		
I Con't	I	Israeli Military Industries	Semi-Automatic Machine Gun- UZI						to that of an APDS round fired from a 105mm tank gun. The 9mm UZI is world acclaimed for reliability, compactness, low recoil, comfort, accuracy, safety and ease of maintenance. It is utilized by armies and law enforcement agencies throughout the free world. Defense experts call it the best in the world.
		Israel Military Industries	Tank Ferry Raft						One tank tows it to the take off point and pushes it into the water. Five minutes later, two 60 ton tanks are aboard. Two or more units link up in minutes to form a floating bridge for direct transit of troops, tanks and vehicles. There is nothing like it

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ARMY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Don't	I	Israeli Military Industries	Hypo Velolocity Medium Support Weapon System (HVMS).					for tank hunting and a 20mm gun for AA. Excellent for riot control and border patrol. Initial development of the 60mm HVMS weapons system was triggered by recognition of the fact that support fire given to infantry is often inadequate. The HVMS has a 60mm automatic gun capable of penetrating modern armor at relatively long range with a kinetic energy projectile and which is at the same time able to fire an explosive shell large enough to cause serious damage to infantry positions, ground troops, helicopters and other targets. The 60mm HVMS round is similar

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS	NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israeli Con't	I	Urban Industries Ltd.	Tank Components				World	destructive capability than modern 105mm gun using standard (L-52) APDS ammunition.
		Israeli Military Industries	Assault Rifle				Hondures	Manufactures ballistic protection suspension tank conversion assault and breeching equipment
		Ramta Structures and Systems (Israeli Aircraft Industries) Combined Technology Division	Armored Reconnaissance Vehicle					5.56mm and 7.62mm GALIL Assault Rifle is a front line infantry weapon utilized by numerous free world armies. All weapons can be fired automatic or semi-automatic, right or left handed, and can launch granader without adapters. The RAM V-1 is designed for multi-mission mobility. The infantry support and combat vehicle is fitted with a 106mm recoilless gun

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	I	Israeli Military Industries	Soltam M-72 and M-109 self-propelled gun/ howitzer					variant other new features, include a hydro-pneumatic suspension system and improved armor/ ballistic protection. (I.O.C. for MK-III is expected in 85/86).
								The M-72 is an Israeli derivative of the M-68 towed gun/ howitzer. As the M-72 is mounted on CENTURION chassis. The M-109 is corresponds to the U.S. M-109A-1 version.
		Israeli Military Industries	Rocket Launcher					Att mpting 290mm four rocket to sell launcher on tank chassis. Rocket has max range of over 40,000m.
		Israeli Military Industries	Ammunition All types/sizes					Israel has developed new 90mm APFS-DS-T round for M47/M48 tank which given weapon greater

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	I	Ramta	Armored Reconnaissance Vehicle					Built primarily for export.
		Israeli Military Industries	Merkava Main Battle Tank 58 ton MBT					Previously called the AOAN Tank after the Israeli Chief of Staff who pushed for the decision to manufacture an indigenous MBT. This indigenous designed and built by Israel's saw combat action against the Soviet T-80 tank during the recent Lebanese war. A MKII version of the MBT with improved fire control is due to enter production very shortly and a prototype of a proposal M-III is expected to be powered initially by a diesel engine although plans exist for development of a gas turbine

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	VII	RAFAEL	Air-to-Air Missile	*				*SHAFRIR Air-to-Air missile has a combat proven 60% kill ratio. It is a copy of the U.S. Sidewinder missile which was reversed engineered by the Israeli Armament Development Authority

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	VII	Israeli Military Industries	Anti-tank Rocket					IMI currently manufacturing a shoulder launched anti-tank rocket called PICKET
		Rafael-Armament Development Authority	Cluster Bomb TAL-1		Developed, according to Israeli, because U.S. refusal to provide cluster bombs during the war of Attrition with Egypt		Yes	Israel has been manufacturing the 250 kg RAFAEL TAL-1 cluster bomb for over 10 years but its existence was not revealed until last year 250 kg weapon with 279 bomblets maximum size of blast area is 25 times larger than effective area of compound GP bombs for anti-personnel
		Israeli Military Industries	Air bombs		Exported to over 20 countries in free world			Range of products include: 130 kg; 250 kg; 360 kg; and 450 kg All bombs are filled with 14 inch spaced NATO standard fuzes.

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	VII	Israeli Products Research Company	Mobile armored water cannon					The cannon allows riot gas to be mixed with water. The water cannon fires a high-jet of water mixed with 1% by weight of C5 gas out to ranges up to 50m. Cannon is mounted into a turret on an armored vehicle which also is fitted with tear gas grenade launchers and mortars to fire tear gas out to 400m. Excellent for riot control.

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COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	VII	Hagel Plant (Division of IAI)	Intrusion Detection System					IAI is in the forefront in manufacturing of three-dimensional unit intrusion systems. First unveiled at last year's Paris Air Show. Few details available. Semi-Active homing, launcher installed without deck penetration. Similar in design to the TCM-30 twin 30mm gun mount. System carries 8 missiles which are supersonic and highly maneuverable. Also intended to counter sea-skimming missiles
		Israeli Aircraft Industries	Point Defense System BARAK					

III - AIRCRAFT

II - NAVAL SHIPS

I - ARMY MATERIAL

IV - ELECTRONICS

V - MISSILE SYSTEMS

VI - CBR MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
	VII	TAT Aero Equipment Industries	Fuel and other gauges				U.S. General Dynamics	General Dynamics is purchasing about \$300 million worth of avionics equipment as part of a "buy back" arrangement when Israel agreed to buy F-16 fighters
		MTCH	Aircraft Engine Parts					

III - AIRCRAFT

II - NAVAL SHIPS

*I - ARMY MATERIAL

IV - ELECTRONICS

V - MISSILE SYSTEMS

VI - CBR MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	VII	Bet-Shemesh Engines	Engine Components					Had display at last Paris Air Show. Producing components for J-79 (GE F4 and KFIR) Engine will be prime contractor for engine assembly for LAVI aircraft development Engine will either be Pratt Whitney 1120 or GE F404 Had display at most recent Paris Air Show Had display at most recent Paris Air Show
		Carmel Forge	Forged Parts					
		Iscar Blades	Precision Forged and Machined gas turbine and jet engine compressor and turbine blades					
		Telkoor	Radar Altimeter					

III - AIRCRAFT

II - NAVAL SHIPS

I - ARMY MATERIAL

IV - ELECTRONICS

V - MISSILE SYSTEMS

VI - CBR MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	V	Rafael-Armament Development Authority	Air-to-Air Missile Python 3					IAI claims orders for \$350 million worth of Gabriels already sold--over 1,000 ns/s. Displayed for the first time at the 1981 Paris Air Show the Python-3 air-to-air missile appears to be a follow-on of the very successful SHAFRIR II system. The Python appears to be faster, has a longer range and is fitted with a new IR seeker having greater sensitivity and a wider look angle.
			Surface-to-Surface missile ZEEV (Young Lion) previously called Jerrieco	*	The French, prior to its arm's embargo in reportedly assisted Israel on the Jerrieco			The ZEEV is a potential nuclear weapon delivery system

III - AIRCRAFT
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 I - ARMY MATERIAL
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 V - MISSILE SYSTEMS
 VI - CBR MATERIAL
 VII - OTHER

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY	
I	V	HABAT (MBT) Israel, Aircraft Industries	Gabriel Surface-to-Surface Missile				<p>Singapore Thailand Taiwan Malaysia South Africa Argentina Kenya (Columbia and Ecuador may have also pur- chased)</p> <p>The Gabriel Weapon system is a combat proven integrated system featuring search radar, fire control units and weapons. It is designed for use on fast patrol boats, frigates, destroyers and other naval craft. Until the recent Falkland crisis, the Gabriel was the only combat proven weapon system in the free world. The Gabriel is exported in three modes:</p> <ul style="list-style-type: none"> - fire and forget - fire and update - fire and control (particularly effective against chaff dispensing targets). 	

VII - OTHER

V - MISSILE SYSTEMS

VI - CBR MATERIAL

III - AIRCRAFT

IV - ELECTRONICS

I - ARMY MATERIAL

II - NAVAL SHIPS

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
Israel	II	Israeli Shipyards Ltd. Haifa, Israel	Hydrofoil	X	U.S./Grumman Aviation	X			equipped with 20mm guns and torpedoes. Israel is also building follow-on units (called DVORA) which carries the Israeli-built GABRIEL surface-to-surface missile system. Smallest of its kind in the Free World.
Israel		Israeli Shipyards Ltd. Haifa, Israel	Missile Boat, Reshef Class					South Africa	Flagstaff MK-II Class Hydrofoil equipped with GABRIEL SSM. Israel has license rights to build up to ten units in Haifa. First unit built by Grumman. Second unit being built at Haifa Shipyards.
Israel		Israeli Shipyards Ltd. Haifa, Israel						South Africa	Shipyard has built at least 25 units of the 4400 ton RESHEF class. All Israeli Navy units carry GABRIEL anti-submarine missiles. All are capable of 25 plus knots

III - AIRCRAFT

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel Con't	II	Israel Shipyards Ltd.	Missile Boat ALIYA-Class					<p>Six units have been exported to South Africa. Four have been exported to Chile.</p> <p>Israel is now only one of four countries who have built or are building Military hydro foils. The others are the U.S., USSR.</p> <p>The ALIYA Class Missile Boat carries four GABRIEL and four Harpoon SSMs. It differs from the RESHEF class mainly by the fact that ALIYA is fitted with a helicopter pad and hanger. The structure consists of a raised platform which serves as the landing pad and can be equipped with a winch-down recovery system. After a helicopter has landed. The center section of the pad,</p>

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
I Con't	II	Israel Shipyards Ltd.	Landing Craft					essentially a lift like those used on aircraft carriers, is lowered into a hanger. When the hanger roof is closed, a new landing pad becomes available for a second helo. The hanger can accommodate the Bell 212, 222 and Lynx helos. *At the Paris Air Show a line drawing of the hanger mounted on the stern of a FLETCHER DD (C class in use by many 3rd World Countries) was observed. The six units built to date are used for extended range (beyond the horizon) firings of the HARIEL missile system). Six landing craft were constructed by I-Tael shipyards in Haifa between 1966-67. At least three of these have been modified to take an

III - AIRCRAFT I - ARMY MATERIAL V - MISSILE SYSTEMS VII - OTHER
 II - NAVAL SHIPS IV - ELECTRONICS VI - CHEM MATERIAL

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Con't	II							Israeli helicopter aboard.
	III	Israeli Aircraft Industries	Sea Scan A/C					Sea Scan is a maritime reconnaissance aircraft utilized by the Israeli Air Force in support of the Israeli Navy. Ideal for over-the-horizon targetting for various surface-to-surface missile systems
		Israeli Aircraft Industries	French Mirage-III		French		Argentina	35 Israeli-built Mirage III A/C called DAGGER have been sold to Argentina since the Falklands conflict. 22 additional DAGGERS have reportedly been sold to Argentina.
		Israeli Aircraft Industries	Kfir Fighter Aircraft		U.S. General Electric			Only portion of aircraft not manufactured in Israel is the G.E. J-79 engine. Because of U.S. engine, U.S. Govt can exercise export control A/C is Delta-winged with top speed

III - AIRCRAFT

II - NAVAL SHIPS

I - ARMY MATERIAL

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VI - CBR MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Don't	III						Bolivia, Mexico, Colombia, (Defense Ministers of Mexico & Colombia visited the KFIR production line during 1982.	of Mach 2.
		Israeli Aircraft Industries	Westwind Executive 4				Honduras	A leading contender in the corporate jet field certified in the U.S., North, South and Central America, Europe and Australia. Powered by twin Garrett TFE 731-3 turbofans.
		Israeli Aircraft Industries	ARAVA				Honduras El Salvador	The ARAVA is used for both military and civil operators to fill the gaps between helicopter and conventional aircraft. The A/C is able

III - AIRCRAFT

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V - MISSILE SYSTEMS

VI - CBR MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	III	Israeli Aircraft Industries	LAVI Jet Aircraft Fighter/Attack (previously referred to as ARIEH (wow))	*	Engine-Pratt & Whitney Israeli firm-Beth Shמש will assemble the PW1120 engine. Some discussion that General Electric P404 may be engine vice PW1120			to transport 24 fully armed troops or (2) stretcher cases. As a cargo carrier, ARAVA's swing-aft fuelage and truck bed loading height enables it to accept bulky loads up to 2.3 tons. EW version of the ARAVA have also reportedly been built.
								The LAVI program is one of the most ambitious military development programs anywhere in the world and is the most ambitious for a developing country. The A/C will be a smaller and cheaper replacement of the A-4 and KFIR A/C. IMI officials expect A/ to be more advanced than the F-16XL or F-18A/C at about \$13 million per copy (81 prices). LAVI will be a compact,

III - AIRCRAFT

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* I - ARMY MATERIAL

IV - ELECTRONICS

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM		NO.	COUNTRY	
Con't	III	Tadiran Electronics Industries, Ltd.	Mini-RPV MASTIFF						advanced technology machine using composites in the wings and other structural components plus state-of-the-art avionics. The MASTIFF is fitted with a zoom video and/c still camera (or special EW/ECM) payload. It is capable of telemetry data transmission, auto tracking, autopilot flight control, real-time processing and display of data and pictures. It is launched from a truck mounted pneumatic launcher. It is very difficult to detect due to its low radar profile and weak IR signature. Virtually a scaled up model aircraft with a tactical radius of 100Km with a max

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM		NO.	COUNTRY	
Israel	III	Israel Aircraft Industries	Mini-RPM Scout						speed of 130Kts and max payload of 30 kg.
	IV	Pan Universe International	Audiogard 1000						Also launched from truck-mounted-catapult. Flies by auto-pilot-on command link is for course and altitude change 15-1 ratio zoom camera in-bolling. Max speed is 157Kts. Excellent for no-risk surveillance and, to bait enemy similar to what Israelis did recently to the Syrians in Baaka valle of Lebanon.
									Pan Universe is the largest Israeli producer of surveillance and intelligence gathering equipment. Audiogard 1000 is a new concept for the protection of bases and other security-sensitive

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
on't	IV	AEL Israel Ltd.	Signal Intelligence Communications Jamming, Airborne Electronic Warfare- Naval Electronic Warfare		Originally a Subsidiary Company of American Engineering Labs. AEL Israel now owned by Swiss and Israeli financed companies.			institutions. It is an audio-based computerize detection network which uses ordinary telephone lines for communication between the control center and the subscriber. AEL is called the EW House of Israel. Is the main supplier of EW equipment to the Israeli Defense Forces.
		TADIRAN Israeli Electronics Industry Ltd.	HF Communications equip for land, sea and air comms.		Main share holders GTE in the U.S. Koor industries in Israel.			280,000 channels at 100 Hz spacing CRYPTOLOGIC add-on available Modern Ad- vanced Microelectronic techniques utilized. TADIRAN supplies virtually all of the

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM		NO.	COUNTRY	
Iran	IV	TADIRAN	CRYPTO Material						communications equipment to the Israeli Defense Force. TADIRAN produces a wide range of crypto graphic material including: - Analog scrambler (simple, inexpensive, low medium security level; - Digital narrow band (high complexity and price, high security level); - Digital wideband (Medium complexity and price high security level). ELTA is Israel's principal producer of radar EL/M-2215 is a modern state of the art airport surveillance radar. ELTA has the capability to supply
		ELTA (Electronic Division Radar	Airport Surveillance Radar						

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DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel Cont	IV							an operational system complete with secondary radar, automatic or manual, consoles with Navigation and Meteorological indicators, communications and intercom, bright display and extractor as well as provide the necessary services of siting and supervising installation work.
		ELTA Electronics	Battleground Surveillance Radar					120km range.
		ELTA Electronics	Fire Control System					The Spider-II Fire Control System for ground-to-air engagements is able to control up to six twin 30mm M5 units.
		ELTA Electronics	Fighter Radar				*	French refusal to deliver MIRAGE fighter to Israel due to a post-1967 arms embargo forced Israel to develop its

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
U.S.	IV							own MIRAGE-III derivative strike aircraft (KFIR). In order to obtain a radar similar in concept to the French ALDA II, Israel developed an indigenous equipment - the EL/M-2001B within a year of unveiling the new radar, ELTA began to circulate data on the larger EL/M 2021 set, a multi-role equipment capable of being retrofitted into A/C such as the F-5 operating in I/J Bank. This radar uses an Inverse-Cassegrain antenna. Signal processing is digital and appropriate wave forms for look-up and look-down operations have been provided. *This radar which is designed for use is the LAVI A/C is also being con-

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY	
Israel	IV	Electronic Corp of Israel Koor Communications	Aircraft Intercom Airport Comm Systems		Subsidiary of ELAL Industries			considered for incorporation into the Italian/ Brazilian AM-X Program.
			Security Systems					Subsidiary of Koor In- dustries - owned solely by Israeli Labor Unit - HISTADRUT.
		Telkoor	Military Power Packs and Electronic Equipment Fuses for Mortar Shells					Also owned by Israeli Labor Union. 90% of all Israeli wage earners - 50% of the population are members of HISTADRUT
		Penguin	Computerized aircraft navigation equipment					
		ElDA BETA	Missile test equipment Perimeter intrusion detection system and mine detector					BETA is designed for installation on a fence. A screen of alarm wires covers the fence and detects any attempt to

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DEFENSE PRODUCTION

TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
			LICENSE/AID	COUNTRY/FIRM	NO.	COUNTRY	
	ELBIT Computers Ltd.	Power Packs and Power Amplifiers -Air-to-Ground/Air-to-Air Fire Control Systems -Digital Wire Control System for MEPAVA tank -Automatic ECM/ELINT System called TIMEX		U.S. Firm Control Data owns 40% Israeli Govt owns 30% ELBIT Corp owns 27%			tamper. ELBIT is an important supplier of military computers and computer-based systems. ELBIT is a leader in Israel in producing state-of-the-art systems for the fundamentals of defense. For example, TIMEX operates in a dense signal environment. The system scans 2 to 18 GHz. TAMAN which has won recognition for its proven inertial systems, specializes in turnkey projects. It is backed by Israeli Aircraft Industries worldwide service/support network.
	ELBIT Precision Instruments Center (a Division of IAI)	Inertial Systems ALHS-AI - the Inertial Navigation System for Military Aircraft MARG-Marine Attitude Reference and Navigation System for Naval Ships DANC-Position and Azimuth Determining System for Artillery		Govt owned corporation			

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AD-A134 638

GROWING DEFENSE PRODUCTION IN NEWLY INDUSTRIALIZING
COUNTRIES: IMPACT ON (U) INDUSTRIAL COLL OF THE ARMED
FORCES WASHINGTON DC J EDENSWORD ET AL. MAY 83

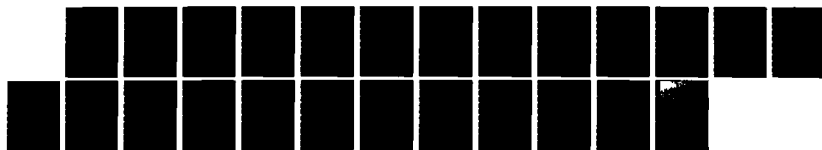
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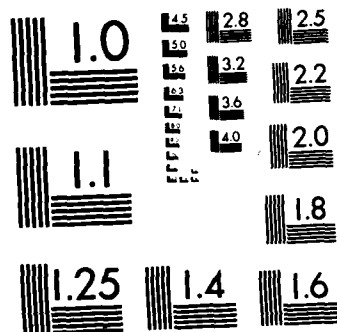
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DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM		NO.	COUNTRY	
Con't	IV	ELTA Electronics Industries (Division of IAI)	LANS-band Navigation System for ground forces. Defense Alert Radar						<p>ELTA's EL/M-2106 Point Defense Alert Radar gives air defense artillery and missile crews audible and visible warnings of immediate airstrikes-- at distances up to 16km. EL/M-2106 is the only radar of its kind. It is portable, quickly deployed, uses standard 24V batteries, solid state and manned by regular AA crews.</p> <p>ELTA is presently developing a remote-controlled spread-spectrum unit to provide greater security in Naval communications. The company has already developed the EL/P-111 secure airborne UHF</p>
			Spread-Spectrum Equipment						

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
		ELBIT Computers Ltd.	Tank Fire Control System (TPCS) ORNIT					radio set which uses spread-spectrum techniques.
		ELBIT Computers Ltd.	Weapons Delivery and Navigation Systems	*For first generation system	U.S. Lear Siegler		Generation 1 and 2 units have been exported	The ELBIT TPCS was designed for the MERKAUA MBT. It is currently also being retrofitted in centurions, M-47, M-48 and M-60 tanks. The system engages stationary and moving targets, at night and in daylight cost effectively and with high first-round hit probability. The TPCS is fully digital, and has an operational range of 4000-5,000m.
		ELBIT Computers Ltd.						ELBIT has launched three generations of airborne weapons delivery and navigation computer-based systems. The first generation system was initially incorporated into the

III - AIRCRAFT

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
U.S.	TV	KRIP Computers Ltd.	Naval Tactical Training Center (TTC)						KFIR aircraft. It is similar to the A-4/F-4 WDS. The second generation WDS project resulted in the new configuration system 81 with improved navigational weapons delivery and ground alignment. The third generation system 82 consists of future-oriented equipment featuring programmable stores management "smart" weapons handling capability, air head-up and head-down display.
									The TTC is a sophisticated computerized shore facility for training naval communicating officers in tactical command-decision procedures by simulation the chain of command that could be encountered at sea.

III - AIRCRAFT IV - ARMY MATERIAL V - MISSILE SYSTEMS VII - OTHER
 II - NAVAL SHIPS VI - ELECTRONICS VI - CDR MATERIAL

DEFENSE PRODUCTION

TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
			LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
	ELBIT Computers Ltd.	Range of Antennas					In addition, the system can be used by higher commands to develop, analyze and test naval combat doctrine. ELBIT is producing antennas over the frequency bands HF to millimeter waves. Some of the most recent developments are the EA-917 lightweight ESM antenna array, the EA-5 low profile broadband survivable VHF tank antenna, the EA-2205 broadband high-gain VHF UHF directional antenna and the 24 broadband high-power vehicular antenna. The SACU units provide simplified, secure high speed transmission/reception in standard message format or in free text.
	ELBIT Computers	Stand Alone Digital Communications Units (SACU)					40% of all ELBIT production is exported

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VI - COM MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
ISRAEL	IV	ELTA	Artillery Command and Control System					<p>ELTA electronics has developed for export a new computer-controlled system which has a large data base and can carry out rapid processing and correlation of information from various sources. The current tactical situation is presented to the Commander on various displays with only priority info being shown. -Produced as a result of 1973 war experiences</p> <p>This countermeasure dispensing system is for shipboard anti-missile application. The system controls launching of Dispensable Electronic Countermeasure effectors such as chaff and flares. System was very successful when utilized during Oct 73 war with Egypt and Syria.</p>
		ELBIT Computers	Automatic Countermeasure Dispensing System (ACDS)					

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VI - CBN MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY	
USA	IV	ELMFA	JHF Radio for Infantry Radio				*	Dispensing is automatic to reduce reaction time and optimize response. *At least five NATO countries have purchased this radio.

III - AIRCRAFT

I - ARMY MATERIAL

V - MISSILE SYSTEMS

VII - OTHER

II - NAVAL SHIPS

IV - ELECTRONICS

VI - COM MATERIAL

DEFENSE PRODUCTION

COUNTRY	TYPE	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
				LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
Morocco	I	ARMSCOR	Ratel Infantry Fighting Vehicle						South African design; six-wheeler; 20mm gun
		ARMSCOR	Eland Light Armored Car	License	France				
		Sandock-Austral Pty. Limited	AMT-90 Armored Car	License	France				
		ARMSCOR	G5 155mm Artillery Piece						Fires entire range of NATO 155mm ammunition; plans to export.
		ARMSCOR	G6 155mm Mobile Artillery Piece						90 kph on good roads; 30 kph on rough terrain.
		ARMSCOR	127mm Artillery Rocket System						Copy of Soviet's Russian Stalin Organ; Truck-mounted; 24 tubes; devastating fire-power.
	II	Sandock-Austral Pty. Ltd.	Reshef class Large Patrol Vessels	License	Israel/Israeli Shipyards, Ltd.				Three boats built in Israel; three boats built in Durban, S.A. with Israeli assistance.
	III	ARMSCOR	Mirage III	License	France/Avions Marcel Dassault (AMD)				

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DEFENSE PRODUCTION

TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE			EXPORTS		NOTES
			LICENSE AID	COUNTRY/FIRM	NO.	COUNTRY		
I-4	ARMSCOR	<u>Mirage F-1C2</u>	License	France AMN			Air superiority fighter	
	ARMSCOR	<u>Mirage F-1AZ</u>	License	France AMD			Ground attack fighter	
	ARMSCOR	<u>Impala</u>	License	Italy/Aermacchi			Two-seat trainer version of the Aermacchi MB-236	
	ARMSCOR	<u>Impala MkII</u>		Rhodesia			Single seat strike version of the trainer	
I-5	ARMSCOR	Radars					Frequency-hopping secure voice feature	
	ARMSCOR	<u>Skorploen missiles</u>					Sea-skimming missiles similar to Israel's Gabriel II anti-ship missile	
II-1	ARMSCOR	Cactus Surface-to-air missile system			6 fire units	Chile via France	Adaptation of the French Crotale system	
	ARMSCOR	Whiplash air-to-air missile			2 radars			

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 II - NAVAL SHIPS VI - CDR MATERIAL IV - ELECTRONICS I - ARMY MATERIAL

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		NOTES
				COUNTRY	FIRM	
South Korea	I	Daewoo Heavy Industries LTD KIA Machine Tool Co., LTD KIA Daewoo, KIA Daewoo, KIA Poong San KIA KIA Daewoo	SMALL ARMS/CREW SERVED VPNS Rifle-U.S. M. 16 Rifle-5.56mm KR Machine Gun-U.S. M. 60 Machine Gun-5.56mm KMG Machine Gun -50cal-U.S. M2 Submachine Gun-5.56mm K1 Spotting Rifle-50cal M8C Grenade Launcher U.S. M79 Light Anti-tank Weapon K1AW Recoilless Rifle 90mm M67 Recoilless Rifle 106mm M42RC Mortar, 4.2 inch M30 Mortar, 81mm KM29A1 Mortar, 60mm KM19 Carbine-M1 ARTILLERY 105mm Howitzer, M101A1 155mm Howitzer, M114A2 Multiple Rocket Launcher AIR DEFENSE Vulcan, 20mm	U.S. U.S.	Colt	Coproduction Korean Design-Production to start @ 1983 Korean Design-Production to start @ 1984 Heavy M.G. Korean Design Korean Design Korean Design Korean Design Korean Design-36 tubes, 155mm self propelled (M162/ towed (M167)

III - AIRCRAFT I - ARMY MATERIAL V - MISSILE SYSTEMS VII - OTHER
 II - NAVAL SHIPS IV - ELECTRONICS VI - CBR MATERIAL

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		NOTES
				COUNTRY	FIRM	
South Korea	I	Hyundai Rolling Stock Co., LTD Hyundai	ARMOR Tank, U.S. M48A5			Upgrading and Dieselization
			Tank, U.S. M47			Korean Design similar to U.S. M1 tank under development, not in production yet
			Tank			Modernization, overhaul, parts
		Hyundai	All tracked vehicles			
			COMBAT VEHICLES 1/4 ton KM41 series			Korean Design, utility truck, ambulance, tow missile carrier, 106RR carrier
		Asia Motors Co., Inc.	5/4 ton KM45 series			Korean Design-cargo, ambulance
		Asia Motors	2.5 ton KM25 series			Korean Design-cargo, shop van, fuel tank, water tank
		Asia Motors	5 ton KM50 series			Cargo Dump, wrecker, tractor
		Asia Motors	Armored Personnel Carrier			Korean Design, KM900 series, carriers
		Asia Motors	Armored Cars	France	Fiat	Ten, wheeled

III - AIRCRAFT

II - NAVAL SHIPS

I - ARMY MATERIAL

IV - ELECTRONICS

V - MISSILE SYSTEMS

VI - CBR MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		EXPORTS	NOTES
			LICENSE NO.	COUNTRY/FIRM	NO.	
	Poong San Metal Corporation KTC	AMMUNITION/EXPLOSIVES Small Calibre				Rifles, MG's, Grenades, vulcan-many-kinds Mortars, RR's-many kinds
	Poong San, Korea Explosives Co., Ltd	Medium Calibre				Artillery, MRC's-many kinds
	Poong San, KEC	Large Calibre				Anti-tank and anti-per- sonnel
	KTC	Mines				TNT, RDX, Comp B, Nitro- celluloid
	KTC	Explosives				Under development-some early help from U.S. mostly Korean Design Hawk
		MISSILES Surface to Surface		U.S./Lockheed		
		Ground to Air				
	Poong San, Korea Marine Indus- try Co., Ltd	FAST PATROL BOATS Whidcat Class		U.S.		L=32M, W=6.5M, Speed= 38 mts
	Poong San, Korea	Leopard Class		U.S.		L=54M, W=8.0M, Speed= over 40mts
	KSC	Other Patrol Craft			Indonesia	About ten different types, lengths up to about 25M, used for Coast Guard type duty

VII - OTHER

V - MISSILE SYSTEMS

VI - ARMY MATERIAL

VIII - ELECTRONICS

IX - AIRCRAFT

X - NAVAL SYSTEMS

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		NOTES
				COUNTRY	FIRM	
South Korea	II	Korea Taroma	AMPHIBIOUS ASSAULT SHIPS Alligator Class LST	Indonesia		L=100M, W=15.4M Speed=15 mts
		Hyundai Heavy Industries	Landing Craft LCPV	Netherlands		L=10.8M, W=3.2M, Speed=9 mts
	III	Korean Air Lines (KAL)	Frigates			500 to 200 tons
			HELICOPTERS 500MP 500 MP/ton FIXED WING C-123a	U.S. U.S.	Hughes Hughes	Production Production
	IV	Korea Explosives Co.,	F-4m			Overhaul only, No Production
			F-5e Jet Engines Bombs			Overhaul only, No Production Coproduction
			COMMUNICATIONS-WIRE Fixed Switchboard Telephone Sets			500lb, 251b (Practice)

III - AIRCRAFT I - ARMY MATERIAL V - MISSILE SYSTEMS VII - OTHER
 II - NAVAL SHIPS IV - ELECTRONICS VI - CBR MATERIAL

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		NOTES
				COUNTRY	FIRM	
South Korea	IV	OPC OPC OPC	COMMUNICATIONS-RADIO KPRC-6A AN/PRC-77, U.S. AN/VRC-12, series, U.S. AN/URC-87, U.S.			Korean Design
			DELTA MUX K-TCC-15			Korean Design-Digital Transmission
			K-TCC-16			Korean Design-Digital Transmission
			K-TCC-17			Korean Design-Digital Transmission
			MULTI CHANNEL SYSTEMS K-AN/TRC-24, 35 and 36			Korean Design
			TELEPHONE TERMINAL			Korean Design-KAN/TCC-7
			MULTIFLEX EQUIPMENT MS518, MW518, and MDR-8			
			MINE DETECTORS NMD-9			Korean Design-non-metal- lic and metallic

III - AIRCRAFT

II - NAVAL SHIPS

I - ARMY MATERIAL

IV - ELECTRONICS

V - MISSILE SYSTEMS

VI - CBR MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		NOTES
				COUNTRY	FIRM	
South Korea	VI	Sam Yang Chemical Co., LTD Sam Yang	GAS MASKS, KM9A1 Chemical Detection Kits Decontamination kits Riot Control Agents			Korean Design Grenades, Capsules, Powder
	VII	Korean Optical Ind Co., LTD KOP	NIGHT OBSERVATION DEVICES AN/TVS-5, U.S. AN/PVS-4, U.S.			
		Eu Sung Industrial Co., LTD	Fire Control System, MK148G Steel Fence NRP Ballistic Helmets Life Jacket Parachutes Uniforms Boots Tents Duffle Bags Insomnia Barbed wire	U.S.	NSWC	Korean Design-Shipboard Use Korean Design

III - AIRCRAFT

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I - ARMY MATERIAL

IV - ELECTRONICS

V - MISSILE SYSTEMS

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VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		NOTES
				COUNTRY	FIRM	
can	1	Hsing Hua Company Ltd. Box 8746 Taipei	700 Mortar, 60 mm, 81 mm 763 Mortar, 120 mm 760 Mortar, 4.2 inch 751 Recoilless Rifle, 106 mm 765 Howitzer, 105 mm 765 Howitzer, 155 mm Ammunition Corp: 40 mm AA, 75 mm H&W 76 mm G&W 90 mm G&W 105 mm H&W 155 mm G&W & H&W 5" / 20 Naval Gun 8-in How Mortar Ammunition Corp: 60 mm Mortar 81 mm Mortar 4.2 inch Mortar 120 mm Mortar Rockets, Fox: 66 mm 2.5 inch 765 Rifle, 5.56 mm 120 - 150 Rd/Hr			The Hsing Hua Company is owned by the Taiwan Government.

III - AIRCRAFT
 II - NAVAL SHIPS
 I - ARMY MATERIAL
 IV - ELECTRONICS
 V - MISSILE SYSTEMS
 VI - CBN MATERIAL
 VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		NOTES
				COUNTRY	FIRM	
Taiwan Cont'	I		T57A1 Rifle, 7.62 mm T57 Machine Gun, 7.62 mm Hand Grenade, Fragmentation Rifle Grenade for 5.56 mm rifle Mines: Anti-tank Anti-personnel Jumping Illuminating Flame Thrower, 40-55m range Fast Attack Craft 70 ft. long Transport Ship for 500 troops, 320 meters long			Two built, carry anti missiles which are believed to be license built versions of the Israel, IAI Gabriel. One built.

III - AIRCRAFT

II - NAVAL SHIPS

'I - ARMY MATERIAL

IV - ELECTRONICS

V - MISSILE SYSTEMS

VI - CBR MATERIAL

VII - OTHER

DEFENSE PRODUCTION

COUNTRY:	TYPE:	PRODUCTION FACILITY	MILITARY PRODUCT	FOREIGN ASSISTANCE		NOTES
				LICENSE AID	COUNTRY/FIRM	
Taiwan	III	Aero-Industry Development Center Taichung, Taiwan	F5-E Jet Fighter			Aircraft assembled under license. A good deal of the electronic circuitry and wiring is produced on Taiwan about 200-250 have been produced. Uses AVCO-CYCOWING Engineers produced under license at Kang Shan. Aircraft had one flight test, no regular production yet.
			T-CH-1 Tandem Two-Seat Turboprop Trainer			
			XL-2 Twin Turboprop Transport			

III - AIRCRAFT

II - NAVAL SHIPS

I - ARMY MATERIAL

IV - ELECTRONICS

V - MISSILE SYSTEMS

VI - CBR MATERIAL

VII - OTHER

TABLE NOTES

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¹²Gregory R. Copley, Michael Moddie, and David Harvey, "Third World Arms Production: An End to Embargoes?" Defense & Foreign Affairs Digest, (Washington, D.C.: Copley and Assoc., August, 1978), p. 30.

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FOOTNOTES TO ACCOMPANY INDIA DEFENSE PRODUCTION CHARTS

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The Information in the spread sheet came from:

- (a) Catalog of the Hsing Hua Company Limited of Taiwan. A copy of which I have.
- (b) Jane's All the World's Aircraft, 1981-1982.
- (c) Jane's Fighting Ships, 1981-1982.
- (d) "Military Technology," Vol. IV, Issue 4, May 1982, p. 94 and issue of 2/82 p. 106 and 2/81.
- (e) "International Defense Review," 9/82, p. 1291.
- (f) "Defense & Foreign Affairs," July 1982, p.v.

APPENDIX II
DEFENSE PUBLIC SECTOR INDUSTRIAL GROUPS*

<u>Name</u>	<u>Major Products</u>
1. Hindustan Aeronautics, Ltd (HAL) Hg-Bangalore	Manufacture and overhaul air-craft, helicopters, engines air to air missiles.
2. Bharat Electronics, Ltd (BEL)-Hg, Bangalore	Communications equipment, radar
3. Mazagon Dock, Ltd. (MDL)-Hg Bombay	shipbuilding and repair
4. Goa Shipyard, Ltd. (GSL)-Hg Goa separate company but subsidiary of MDL	Ship repair, barge, tug and ship building
5. Garden Reach Workshop, Ltd Hg Calcutta	Construction of large dredges and harbor craft, pumps, cranes and diesel engines
6. Praga Tools, Ltd. (PTL)-Hg Secundrabad	Machine Tools
7. Bharal Earth Movers, Ltd (BEML)-Hg Bangalore	Heavy earth moving equipment
8. Bharat Dynamics, Ltd (BDL)-Hg Hyderabad	Guided missiles, anti-tank missiles
9. Mishra Dhatu Nigaw, Ltd (MDNL)-Hg Hyderabad	Special metals and alloys required by aeronautical electronic and instrument industries

*From: Agarwal, Rajesh K., Defense Production and Development, New Delhi: Arnold-Heinemann, 1978.

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